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=> file reg
FILE 'REGISTRY' ENTERED AT 09:38:05 ON 06 NOV 2003
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=> display history full l1-


     FILE 'REGISTRY' ENTERED AT 08:56:48 ON 06 NOV 2003
                    E CHLORINE/CN
L1                1 SEA CHLORINE/CN
                    E BROMINE/CN
L2                1 SEA BROMINE/CN
                    E IODINE/CN
L3                1 SEA IODINE/CN
                    E CALCIUM HYPOCHLORITE/CN
L4                1 SEA "CALCIUM HYPOCHLORITE"/CN
                    E CALCIUM HYPOBROMITE/CN
L5                1 SEA "CALCIUM HYPOBROMITE"/CN
                    E CALCIUM HYPOIODITE/CN
L6                1 SEA "CALCIUM HYPOIODITE"/CN
                    D L4 SCAN
                    E MAGNESIUM HYPOCHLORITE/CN
L7                1 SEA "MAGNESIUM HYPOCHLORITE"/CN
                    E MAGNESIUM HYPOBROMITE/CN
                    E MAGNESIUM HYPOIODITE/CN
                    E BARIUM HYPOCHLORITE/CN
L8                1 SEA "BARIUM HYPOCHLORITE"/CN
                    E BARIUM HYPOBROMITE/CN
L9                1 SEA "BARIUM HYPOBROMITE"/CN
                    E BARIUM HYPOIODITE/CN
                    E STRONTIUM HYPOCHLORITE/CN
L10               1 SEA "STRONTIUM HYPOCHLORITE"/CN
                    E STRONTIUM HYPOBROMITE/CN
                    E STRONTIUM HYPOIODITE/CN

     FILE 'HCA' ENTERED AT 09:08:49 ON 06 NOV 2003
L11          229121 SEA COAL?
L12          326574 SEA FLUEGAS## OR OFFGAS## OR WASTEGAS## OR (FLUE OR OFF
                    OR WASTE# OR DISCHARG? OR EMISSION? OR EMIT? OR EMANAT?)(
                    2A)GAS## OR EFFLUEN? OR EFFLUV? OR FUME# OR FUMING# OR
                    EFFUS? OR EFFLUX? OR EFFUS?
L13          186830 SEA L1 OR L2 OR L3 OR (MOLECUL? OR ELEMENTAL? OR
                    DIATOMIC?)(2A)(HALOGEN# OR CHLORINE# OR BROMIDE# OR
                    IODINE#) OR CL2 OR BR2 OR I2
L14            5334 SEA (L4 OR L5 OR L6 OR L7 OR L8 OR L9 OR L10) OR CLOH OR
                    HOCL OR CLHO OR OHCL
L15           24588 SEA HYPOHALITE# OR HYPOCHLORITE# OR HYPOBROMITE# OR
                    HYPOIODITE#
```

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     FILE 'REGISTRY' ENTERED AT 09:15:54 ON 06 NOV 2003
                    E MERCURY/CN
L16               1 SEA MERCURY/CN

     FILE 'LCA' ENTERED AT 09:16:03 ON 06 NOV 2003
L17            2452 SEA (RECOVER? OR RECLAMAT? OR RECLAIM? OR RETRIEV? OR
                    SALVAG? OR REGENERAT? OR RECONDITION? OR REFORM? OR
                    RECONSTITUT? OR REUSE# OR REUSING# OR RECYCL? OR
                    REPROCESS?)/BI,AB
L18               4 SEA (RE(W)(COVER? OR CLAMAT? OR CLAIM? OR GENERAT? OR
                    CONDITION? OR FORM? OR CONSTITUT? OR USE# OR USING# OR
                    CYCL? OR PROCESS?))/BI,AB
L19           11074 SEA CAPTUR? OR SCRUB? OR EXTRACT? OR EXT# OR EXTN# OR
                    FILTER? OR FILTRAT? OR ISOLAT? OR SEPARAT? OR SEP# OR
                    SEPN# OR REMOV? OR EXTRICAT? OR STRIP? OR EXCIS?

     FILE 'HCA' ENTERED AT 09:23:14 ON 06 NOV 2003
L20           13530 SEA (L17 OR L18 OR L19)(2A)(L16 OR MERCURY# OR HG)
L21             292 SEA L11 AND L12 AND L20
L22              28 SEA L21 AND L13
L23               2 SEA L21 AND L14
L24               2 SEA L21 AND L15
L25               3 SEA L23 OR L24
L26              26 SEA L22 NOT L25
L27               2 SEA L25 AND L22
L28               3 SEA L25 OR L27

     FILE 'WPIX, JAPIO' ENTERED AT 09:31:10 ON 06 NOV 2003
L29           58051 SEA COAL?
L30           15959 SEA COAL?
     TOTAL FOR ALL FILES
L31           74010 SEA COAL?
L32          128551 SEA FLUEGAS## OR OFFGAS## OR WASTEGAS## OR (FLUE OR OFF
                    OR WASTE# OR DISCHARG? OR EMISSION? OR EMIT? OR EMANAT?)(
                    2A)GAS## OR EFFLUEN? OR EFFLUV? OR FUME# OR FUMING# OR
                    EFFUS? OR EFFLUX? OR EFFUS?
L33           47727 SEA FLUEGAS## OR OFFGAS## OR WASTEGAS## OR (FLUE OR OFF
                    OR WASTE# OR DISCHARG? OR EMISSION? OR EMIT? OR EMANAT?)(
                    2A)GAS## OR EFFLUEN? OR EFFLUV? OR FUME# OR FUMING# OR
                    EFFUS? OR EFFLUX? OR EFFUS?
     TOTAL FOR ALL FILES
L34          176278 SEA FLUEGAS## OR OFFGAS## OR WASTEGAS## OR (FLUE OR OFF
                    OR WASTE# OR DISCHARG? OR EMISSION? OR EMIT? OR EMANAT?)(
                    2A) GAS## OR EFFLUEN? OR EFFLUV? OR FUME# OR FUMING# OR
                    EFFUS? OR EFFLUX? OR EFFUS?
L35           18754 SEA (MOLECUL? OR ELEMENTAL? OR DIATOMIC?)(2A)(HALOGEN#
                    OR CHLORINE# OR BROMIDE# OR IODINE#) OR CL2 OR BR2 OR I2
L36            2964 SEA (MOLECUL? OR ELEMENTAL? OR DIATOMIC?)(2A)(HALOGEN#
                    OR CHLORINE# OR BROMIDE# OR IODINE#) OR CL2 OR BR2 OR I2
     TOTAL FOR ALL FILES
L37           21718 SEA (MOLECUL? OR ELEMENTAL? OR DIATOMIC?)(2A)(HALOGEN#
                    OR CHLORINE# OR BROMIDE# OR IODINE#) OR CL2 OR BR2 OR I2
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L38         6992 SEA CLOH OR HOCL OR CLHO OR OHCL OR HYPOHALITE# OR
                 HYPOCHLORITE# OR HYPOBROMITE# OR HYPOIODITE#
L39         1910 SEA CLOH OR HOCL OR CLHO OR OHCL OR HYPOHALITE# OR
                 HYPOCHLORITE# OR HYPOBROMITE# OR HYPOIODITE#
     TOTAL FOR ALL FILES
L40         8902 SEA CLOH OR HOCL OR CLHO OR OHCL OR HYPOHALITE# OR
                 HYPOCHLORITE# OR HYPOBROMITE# OR HYPOIODITE#
L41         2409 SEA (L17 OR L19)(2A)(MERCURY# OR HG)
L42          546 SEA (L17 OR L19)(2A)(MERCURY# OR HG)
     TOTAL FOR ALL FILES
L43         2955 SEA (L17 OR L19)(2A)(MERCURY# OR HG)
L44           32 SEA L29 AND L32 AND L41
L45            2 SEA L30 AND L33 AND L42
     TOTAL FOR ALL FILES
L46           34 SEA L31 AND L34 AND L43
L47            2 SEA L44 AND (L35 OR L38)
L48            0 SEA L45 AND (L36 OR L39)
     TOTAL FOR ALL FILES
L49            2 SEA L46 AND (L37 OR L40)
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=> file wpix
FILE 'WPIX' ENTERED AT 09:39:04 ON 06 NOV 2003
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FILE LAST UPDATED:            5 NOV 2003      <20031105/UP>
MOST RECENT DERWENT UPDATE:      200371        <200371/DW>
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE


=> d l47 1-2 max
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L47 ANSWER 1 OF 2 WPIX COPYRIGHT 2003 THOMSON DERWENT on STN
AN 2002-698105 [75] WPIX
DNN N2002-550544
TI **Mercury** vapor **removing** process in **coal**
fired boiler, involves oxidizing **flue gas** by
gas oxidizing agent at gas oxidizing agent region for
removing mercury vapor from **flue**
gas.
DC X11 X25
IN COLE, J A
PA (COLE-I) COLE J A
CYC 1
PI US 2002114749 A1 20020822 (200275)* 5p B01D053-64
ADT US 2002114749 A1 US 2000-745014 20001222
PRAI US 2000-745014 20001222
IC ICM B01D053-64
AB US2002114749 A UPAB: 20021120
NOVELTY - A **flue gas** is made to contact a gas
oxidizing agent at a gas oxidizing agent region so that the
flue gas is oxidized for **removing**

mercury vapor from **flue gas**.
USE - For **removing mercury** vapor from **flue gas** produced by combustion of **coal** and fossil fuels in **coal**-fired boiler, in generator and other combustion systems.
ADVANTAGE - Cheaply controls the mercury emitted during combustion of **coal** by decreasing the consumption of electrical power and the expense of controlling mercury vapor emissions.
DESCRIPTION OF DRAWING(S) - The figure shows a plot of mercury conversion as a function of gas temperature.
Dwg.1/1

TECH US 2002114749 A1UPTX: 20021120
TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - The oxidizing agent is selected from chlorine, oxides of chlorine, H2O2, **HOCl**, compounds of chlorine, F2, **Br2**, **I2**, Kr2, H2S, SO3, H2SO4, CH3SH and CH2S.

FS EPI
FA AB; GI
MC EPI: X11-A09; X25-H02A

L47 ANSWER 2 OF 2 WPIX
AN 1993-167449 [20] WPIX
DNC C1993-074640
TI Enhancing **mercury removal** from **coal** combustion **flue-gas** - by adjusting chloride concn. in spray drying absorption system.
DC E36 J01
IN CHRISTIANSEN, O; FELSVANG, K; NIELSEN, K; FELSVANG, K S; CHRISTIANSEN, O B; NIELSEN, K K; OVE, B C
PA (NIRO) NIRO AS
CYC 18

```
PI    WO 9308902    A1 19930513 (199320)* EN   27p   B01D053-34
         RW: AT BE CH DE DK ES FR GB GR IE IT LU MC NL SE
          W: CA FI US
      FI 9402058    A  19940504 (199428)             B01D000-00
      EP 613397     A1 19940907 (199434)  EN         B01D053-34
          R: AT DE DK GB IT
      EP 613397     B1 19950705 (199531)  EN   12p   B01D053-34
          R: AT DE DK GB IT
      US 5435980    A  19950725 (199535)       8p    C01G013-04
      DE 69203350   E  19950810 (199537)             B01D053-34
      FI 104413     B1 20000131 (200012)             B01D053-34
      CA 2121508    C  20020416 (200234)  EN         B01D053-34
```

ADT WO 9308902 A1 WO 1992-DK318 19921103; FI 9402058 A WO 1992-DK318 19921103, FI 1994-2058 19940504; EP 613397 A1 EP 1992-923706 19921103, WO 1992-DK318 19921103; EP 613397 B1 EP 1992-923706 19921103, WO 1992-DK318 19921103; US 5435980 A US 1991-787433 19911104; DE 69203350 E DE 1992-603350 19921103, EP 1992-923706 19921103, WO 1992-DK318 19921103; FI 104413 B1 WO 1992-DK318 19921103, FI 1994-2058 19940504; CA 2121508 C CA 1992-2121508 19921103, WO 1992-DK318 19921103

FDT EP 613397 A1 Based on WO 9308902; EP 613397 B1 Based on WO 9308902; DE 69203350 E Based on EP 613397, Based on WO 9308902; FI 104413 B1 Previous Publ. FI 9402058; CA 2121508 C Based on WO 9308902
PRAI US 1991-787433 19911104
REP 1.Jnl.Ref; EP 1456; EP 253563; EP 254697; EP 405565; FR 2126361; GB 1336084; US 4619608
IC ICM B01D053-34; C01G013-04
ICS B01D053-50; B01D053-64
AB WO 9308902 A UPAB: 19931113

Flue gases at 110-170 deg.C from low chloride **coal** combustion are fed to a drying chamber supplied with an aq. suspension of basic absorbent from an atomiser. H2O content of the absorbent droplets formed evaporates with formation of fine dry particulates. Droplets and particulates sorb oxides of sulphur and nitrogen, hydrogen halides plus Hg from the **gas**. The **flue gas** contg. entrained loaded absorbent is then fed to a particle collector for gas/solid sepn. and cleaned **gas** obtd. is **discharged.** Process is characterised by keeping chloride concn. in the drying chamber above a min. concn. to enhance Hg sequestration by the droplets/particulates of absorbent.

Adjustment of chloride concn. is pref. by addn. of NaCl and/or CaCl2 or **Cl2** contg. material to the suspension or the **coal**. Alternatively HCl can be added to the **flue gas**. Activated carbon is also added to the **flue gas** upstream of the particle collector to further improve **Hg removal**. Chloride concn. in **fluegas** can be estimated from the chloride content in the **coal** or by measuring devices placed in the gas stream.

USE/ADVANTAGE - 90-99% of Hg in **flue gas** can be removed by increasing chloride concn. in drying chamber to 20-150 ppm. **Hg removal** is compatible with desulphurisation. Hg may be present as vapour, a cpd. or complex. Dwg.0/1

ABEQ EP 613397 B UPAB: 19950810

A method for removing noxious components including sulphur dioxide and mercury from a hot **flue gas** having a temperature of 110-170 deg.C and resulting from the combustion of **coal** having a low chloride content, in which process an aqueous suspension of a basic absorbent in a drying chamber of a drying-absorption zone comprising a drying chamber and a particle collector as well as a duct connecting them, is atomized to fine droplets into the hot **flue gas**, the water of said droplets evaporates leaving dry fine particles, and a part of noxious components of the gas including sulphur oxides, hydrogen halides and nitrogen oxides and mercury, is simultaneously sorbed by the droplets and the fine particles, whereupon the **flue gas** with entrained dry fine particles is passed to the particle collector wherein contact between the particles and the **flue gas** causes a further sorption of noxious compounds, in which the amount of chloride supplied to the drying-absorption zone is increased to an extent sufficient to

```
     improve the Hg sequestering capability of the process.
     Dwg.0/1
ABEQ US    5435980 A UPAB: 19950905
     Flue gas cleaning process is claimed for
     elemental Hg vapour contg. flue gas of temp.
     110-170 deg.C resulting from combustion of coal having
     chloride control insufficient to convert elemental Hg vapour to
     HgCl2. Aq. suspension of basic absorbent is atomised to fine
     droplets in the gas. The water of the droplets is evaporated to form
     dry fine basic absorbent particles. Part of noxious components in
     gas including SOx, to H halides and NOx and Hg is simultaneously
     absorbed by the basic to particles.
          The flue gas with entrained dry absorbed
     particles passed to the particle collector when contact between the
     particles and flue gas cause further sorption of
     noxious components. The amt. of chloride applied to drying-absorbing
     zone is increased to a quality sufficient to convert elemental Hg to
     HgCl2 to improve the sequestering of the droplets.
          ADVANTAGE - Permanent high Hg removal is
     achieved.
     Dwg.0/1
FS   CPI
FA   AB; DCN
MC   CPI: E11-Q02; E31-B03D; E31-F01A; E31-H02; E33-B; E34-D02; E35-E;
          J01-E02A
DRN  1681-U; 1706-U; 1781-U; 1784-U; 1895-U; 1953-U
CMC  UPB   19931202
     M3   *01* C107 C108 C216 C307 C316 C520 C540 C730 C800 C801 C802 C803
               C804 C805 C807 M411 M750 M903 M904 M910 Q431 Q436
               DCN: R01784-X; R01953-X
     M3   *02* A680 A940 C017 C100 C730 C801 C803 C804 C805 C806 C807 M411
               M750 M903 M904 M910 Q431 Q436
               DCN: R01681-X
     M3   *03* A111 A220 A940 C017 C100 C730 C801 C803 C804 C805 C806 C807
               M411 M781 M782 M903 M904 M910 Q431 Q436 Q508
               DCN: R01706-M; R01706-R; R01895-M; R01895-R
     M3   *04* C017 C100 C810 M411 M781 M782 M903 M904 M910 Q431 Q436 Q508
               DCN: R01781-M; R01781-R


=> file hca
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=> d l28 1-3 cbib abs hitstr hitind

L28  ANSWER 1 OF 3  HCA  COPYRIGHT 2003 ACS on STN
139:184655  Enhanced mercury control in coal-fired power
     plants.  Oehr, Klaus H. (Can.).  U.S. Pat. Appl. Publ. US 2003161771
```

A1 20030828, 7 pp. (English). CODEN: USXXCO. APPLICATION: US 2002-73986 20020214.

AB The present invention relates to a method of reducing the mercury emissions for **coal**-fired power plants. This method includes injecting a mol. halogen or thermolabile mol. halogen precursor able to decomp. to form mol. halogen at **flue gas** temp. The mol. **halogen** converts **elemental** mercury to mercuric halide adsorbable by alk. solids such as subbituminous or lignite **coal** ash, alkali fused bituminous **coal** ash capturable in whole or part by electrostatic precipitators (ESPs), baghouses (BHs), fabric filters (FFs), dry **flue gas** desulfurization solids, with or without subsequent adsorption by a liq. such as a **flue gas** desulfurization scrubbing liquor. Given examples show that it is possible to achieve dramatic mercury emission redn. through appropriate use of conventional installed equipment and techniques in combination with the teachings of the current invention.

IT **7553-56-2**, Iodine, reactions **7726-95-6**, Bromine, reactions **7778-54-3**, Calcium **hypochlorite** **7782-50-5**, Chlorine, reactions

(enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I— I

RN 7726-95-6 HCA

CN Bromine (8CI, 9CI) (CA INDEX NAME)

Br— Br

RN 7778-54-3 HCA

CN Hypochlorous acid, calcium salt (8CI, 9CI) (CA INDEX NAME)

Cl— OH

1/2 Ca

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl— Cl

IT **7553-56-2D**, Iodine, compds. **7726-95-6D**, Bromine,
compds. **7782-50-5D**, Chlorine, compds.
(thermolabile; enhanced mercury control in **coal**-fired
power plants by injection of halogen and adsorption of resulting
mercuric chloride)
RN 7553-56-2 HCA
CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

RN 7726-95-6 HCA
CN Bromine (8CI, 9CI) (CA INDEX NAME)

Br—Br

RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC ICM B01D053-64
NCL 423210000
CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51
ST **mercury removal coal** fired power plant
flue gas halogen; **flue gas**
mercury removal chlorine mercuric chloride
adsorption
IT **Flue gas** desulfurization
(alk. particles derived from; enhanced mercury control in
coal-fired power plants by injection of halogen and
adsorption of resulting mercuric chloride)
IT **Filters**
(bags; enhanced **mercury** control in **coal**-fired
power plants by injection of halogen and adsorption of resulting
mercuric chloride)
IT Ashes (residues)
(**coal**, subbituminous, lignite or alkali fused
bituminous **coal** ash; enhanced mercury control in
coal-fired power plants by injection of halogen and
adsorption of resulting mercuric chloride)
IT **Coal**, processes
(combustion of; enhanced mercury control in **coal**-fired
power plants by injection of halogen and adsorption of resulting
mercuric chloride)
IT Electrostatic precipitation
Electrostatic precipitation apparatus
Flue gases
(enhanced mercury control in **coal**-fired power plants by

injection of halogen and adsorption of resulting mercuric chloride)

IT **Hypochlorites**
(enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT **Filters**
(fabric; enhanced **mercury** control in **coal** -fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT Lime (chemical)
(mercuric halide adsorbent derived from **flue gas** desulfurization **wastes**; enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT Adsorption
(of mercuric halides; enhanced mercury control in **coal** -fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT **Flue gases**
(power-plant **flue gases**; enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT Filtration
(using baghouse or fabric **filters**; enhanced **mercury** control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT **7553-56-2**, Iodine, reactions **7726-95-6**, Bromine, reactions **7778-54-3**, Calcium **hypochlorite** **7782-50-5**, Chlorine, reactions 7789-48-2, Magnesium bromide 10043-52-4, Calcium chloride, reactions 12298-68-9, Potassium triiodide
(enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT 7439-97-6, Mercury, processes
(enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT 7487-94-7, Mercuric chloride, processes
(mercuric halide adsorbent derived from **flue gas** desulfurization **wastes**; enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT 471-34-1, Calcium carbonate, processes 1305-62-0, Calcium hydroxide, processes 1305-78-8, Calcium oxide, processes
(mercuric halide adsorbent derived from **flue gas** desulfurization **wastes**; enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

IT **7553-56-2D**, Iodine, compds. **7726-95-6D**, Bromine,

compds. **7782-50-5D**, Chlorine, compds.
(thermolabile; enhanced mercury control in **coal**-fired power plants by injection of halogen and adsorption of resulting mercuric chloride)

L28 ANSWER 2 OF 3 HCA COPYRIGHT 2003 ACS on STN
135:244758 Thermochemical study of mercury oxidation in utility boiler **flue gases**. Widmer, Neil C.; West, Janice; Cole, Jerald A. (GE Energy and Environmental Research Corporation, Irvine, CA, 92618, USA). Proceedings of the Air & Waste Management Association's Annual Conference & Exhibition, 93rd, Salt Lake City, UT, United States, June 18-22, 2000, 1601-1610. Air & Waste Management Association: Pittsburgh, Pa. (English) 2000. CODEN: 69BMLL.

AB Previous studies of **mercury capture** in wet scrubbers reported that over 80% mercury control was achieved for certain Municipal Waste Combustor configurations utilizing acid gas scrubbers. In general it was noted that high levels of **mercury capture** were obsd. in waste processing systems that did not employ a rapid **flue gas** quench directly after the primary combustion chamber. The performance data suggested that the rapid quench was interfering with the conversion of elemental mercury to the sol. HgCl2 form, and therefore the acid gas scrubber could not effectively **capture** the **mercury**. A series of simple expts. were run to examine the impact of thermal quench rate on mercury oxidn. by chlorine species under MWC exhaust conditions. The results permitted development of a global reaction rate const. for mercury oxidn. Subsequent anal. of these data and the rate const. using thermochem. principles led to the development of a kinetic mechanism describing the reactions of mercury in the presence chlorine-contg. mols. and radical species. This mechanism predicts that the rate-limiting step in mercury oxidn. by chlorine is the Cl radical attack on elemental mercury. Subsequently the HgCl radical can react quickly with even small concns. of mol. chlorine. Although reactions of HgCl with HCl, Cl, or **HOCl** are possible, they appear to be significantly slower in the temp. range of interest. The predicted rate const. for the initial attack of Cl on mercury was in the expected range of about 1016 cm6.cntdot.mol-2.cntdot.s-1. Under **coal**-fired utility conditions, however, HCl concns. are orders of magnitude lower than in MWCs, so that obsd. rates of mercury oxidn. are much slower. Application of the kinetic model to **coal** combustion conditions suggests limitations as well as opportunities for cost effective enhancement of **mercury capture** in utility boilers.

CC 51-18 (Fossil Fuels, Derivatives, and Related Products)
Section cross-reference(s): 59

ST **flue gas** mercury oxidn thermochem

IT **Flue gases**
(boiler; thermochem. of mercury oxidn. in utility boiler **flue gases**)

IT 7439-97-6, Mercury, processes
(thermochem. of mercury oxidn. in utility boiler **flue gases**)

L28 ANSWER 3 OF 3 HCA COPYRIGHT 2003 ACS on STN
129:152556 **Waste gas** treatment method and apparatus for removing extremely low concentration of mercury. Takao, Akikazu; Kanda, Masahiro; Inai, Yasuko; Ito, Shigeji; Marui, Kazuhito (Kawasaki Heavy Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10216476 A2 19980818 Heisei, 12 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-33055 19970131.

AB This **waste gas** treatment method comprises desulfurization for a **waste gas** contg. metal Hg vapor and SO2 in a single tower type desulfurization app. and dust removal from the resultant **waste gas**: and a **Hg removing** agent is added to .gtoreq.1 of a circulated liq. in the tower, an absorption liq., water supplied to an elec. dust collector, circulated water of the dust collector, water in the collector main body, and the resultant **waste gas** at the inlet of the dust collector. Modified methods are also claimed. The **Hg removing** agent may be chelating agents. The app. for **waste gas** treatment comprises a single tower type desulfurization app., a wet type elec. dust collector, and a **Hg removing** agent supplying means connected with .gtoreq.1 of a circulated liq. pipe, an adsorption tower main body, a water supply pipe of the dust collector, a water circulating pipe, the dust collector main body, and a **waste gas** duct at the inlet of the dust collector. Hg vapor with concn. as low as 10 .mu.g/Nm3 level can be removed from a **waste gas**, esp. an incinerator **flue gas**.

IT **7553-56-2**, Iodine, uses
(**mercury removing** agent; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

IC ICM B01D053-64
ICS B01D053-34; B01D053-50; B01D053-77

CC 59-4 (Air Pollution and Industrial Hygiene)

ST **mercury** vapor **removal waste gas** treatment; **flue gas mercury removal** chelating agent

IT Chelating agents
(as **mercury removing** agent; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury**

removing agent)

IT Ashes (residues)
(**coal**, **mercury removing** agent; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT **Flue gases**
(incinerator; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT Pyrite-group minerals
(**mercury removing** agent; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT **Flue gas** desulfurization
(**mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT 7440-44-0, Carbon, uses
(activated, **mercury removing** agent; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT 1335-30-4, Aluminum silicate 1344-28-1, Alumina, uses 1344-67-8, Copper chloride 7440-50-8, Copper, uses **7553-56-2**, Iodine, uses 7631-86-9, Silica, uses 7681-52-9, Sodium **hypochlorite** 7704-34-9, Sulfur, uses 7722-84-1, Hydrogen peroxide, uses 10043-52-4, Calcium chloride, uses 11126-12-8, Iron sulfide 11132-78-8, Manganese chloride 12040-57-2, Iron chloride 21055-93-6, Sodium diethylthiocarbamate 39377-56-5, Lead sulfide
(**mercury removing** agent; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT 7446-09-5, Sulfurdioxide, processes
(**removal**; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

IT 7439-97-6, **Mercury**, processes
(vapor **removal**; **mercury** vapor **removal** in desulfurization treatment of **waste gases** by **mercury removing** agent)

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L26 ANSWER 1 OF 26 HCA COPYRIGHT 2003 ACS on STN
139:294235 Predicting the levels and speciation of mercury in **coal**-derived utility exhaust streams. Niksa, Stephen; Fujiwara, Naoki (Niksa Energy Associates, Belmont, CA, 94002, USA). Proceedings of the International Technical Conference on Coal Utilization & Fuel Systems, 28th(Vol. 1), 199-210 (English) 2003. CODEN: PTCSFT. Publisher: Coal Technology Association.

AB The Hg oxidn. mechanism features Hg oxidn. by gaseous Cl-species, according to a 104-step mechanism that accounts for interaction among all important exhaust species, and a heterogeneous oxidn. mechanism on unburned carbon (UBC) particles, similar to established chem. for dioxin prodn. under similar conditions. A **sep**. mechanism for **Hg** adsorption on UBC enables predictions of the levels and speciation of Hg compds. leaving particulate control devices in most full-scale systems. Predictions from these mechanisms for full-scale systems identify the most important operating conditions in the furnace and exhaust system, including SOx, COx, NOx, unburned carbon levels, and exhaust gas quench rate and residence time, as well as the most important **coal** properties, including **coal**-chlorine.

IT **7782-50-5**, Chlorine, reactions
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 51-18 (Fossil Fuels, Derivatives, and Related Products)

ST speciation mercury **coal** utility **flue gas** chlorine oxidn ash; heterogeneous surface reaction mechanism carbon ash particle mercury model

IT **Flue gases**
(boiler; predicting levels and speciation of mercury in **coal**-derived utility exhaust streams)

IT Ashes (residues)
(fly; predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)

IT Oxidation
(of mercury by Cl species; predicting levels and speciation of mercury in **coal**-derived utility exhaust streams)

IT Adsorption
(of mercury species onto unburned carbon particulates; predicting levels and speciation of mercury in **coal**-derived utility exhaust streams)

IT Simulation and Modeling, physicochemical
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)

IT **Coal**, analysis
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)

IT Reaction mechanism
(surface, interactions with ash, sorbents, and aerosols; predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 7439-97-6, Mercury, analysis
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 11104-93-1, Nitrogen oxide, formation (nonpreparative) 12624-32-7, Sulfur oxide 12795-06-1, Carbon oxide
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 7439-97-6D, Mercury, compds.
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 7487-94-7, Mercury chloride (HgCl2), formation (nonpreparative)
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 7546-30-7, Mercury chloride (HgCl)
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 7647-01-0, Hydrochloric acid, reactions
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT **7782-50-5**, Chlorine, reactions
(predicting levels and speciation of mercury in **coal** -derived utility exhaust streams)
IT 7440-44-0, Carbon, processes
(unburned, particles; predicting levels and speciation of mercury in **coal**-derived utility exhaust streams)

L26 ANSWER 2 OF 26 HCA COPYRIGHT 2003 ACS on STN
139:265033 Fixed-bed studies of the interactions between mercury and **coal** combustion fly ash. Dunham, Grant E.; DeWall, Raymond A.; Senior, Constance L. (Energy and Environmental Research Center, Grand Forks, ND, 58203, USA). Fuel Processing Technology, 82(2-3), 197-213 (English) 2003. CODEN: FPTEDY. ISSN: 0378-3820. Publisher: Elsevier Science B.V..
AB Sixteen different fly ash samples, generated from pilot- and full-scale combustion systems, were exposed to a simulated **flue gas** contg. elemental Hg or HgCl2 in a bench-scale reactor system at the Energy and Environmental Research Center to evaluate interactions and det. the effect of temp., Hg species, and ash type on adsorption of Hg and oxidn. of elemental Hg. Fly ash was characterized for surface area, loss on ignition, and Fe forms in the ash. While many ash samples oxidized elemental Hg, not all of samples that oxidized **Hg** also **captured** elemental **Hg**; however, no elemental **Hg capture** was obsd. without accompanying oxidn. Generally, elemental Hg oxidn. increased with increasing amt. of magnetite in ash; however, 1 high-C subbituminous ash with no magnetite exhibited considerable Hg oxidn. which may have been due to unburned C. Surface area and the nature of the surface appeared

to be important for elemental Hg oxidn. and adsorption. The capacity of ash samples for HgCl2 was similar to that for elemental Hg. There was a good correlation between the capacity for HgCl2 and surface area; capacity decreased with increasing temp.

IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 60-4 (Waste Treatment and Disposal)
Section cross-reference(s): 51, 59

ST **coal** combustion fly ash adsorption elemental mercury mercury chloride; oxidn elemental mercury **coal** combustion fly ash; mercury chloride adsorption oxidn **coal** combustion fly ash; **flue gas coal** fired power generation **mercury removal**

IT Ferrites
(calcium-magnesium, fly ash contg.; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT **Flue gases**
(**coal** combustion; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT Ashes (residues)
(**coal** fly; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT Power
(**coal**-fired generation of; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT Air pollution
(control; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT Adsorption
Oxidation
(elemental mercury; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side

particulate collection devices)

IT **Coal**, uses
(power generation from combustion of; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT 7439-97-6, Mercury, processes
(elemental; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT 7487-94-7, Mercury chloride (HgCl2), processes
(fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT 124-38-9, Carbon dioxide, occurrence 7446-09-5, Sulfur dioxide, occurrence 7647-01-0, Hydrogen chloride, occurrence 7727-37-9, Nitrogen, occurrence 7732-18-5, Water, occurrence 7782-44-7, Oxygen, occurrence 10102-43-9, Nitric oxide, occurrence 10102-44-0, Nitrogen dioxide, occurrence
(**flue gas** contg.; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

IT 1309-37-1, Ferric oxide, occurrence 1309-38-2, Magnetite, occurrence 1317-60-8, Hematite, occurrence 1345-25-1, Ferrous oxide, occurrence 11113-52-3, Calcium ferrite
(fly ash contg.; fixed-bed studies of ash surface area and iron content effect on adsorption and oxidn. of mercury by **coal** fly ash at temps. characteristic of cold-side particulate collection devices)

L26 ANSWER 3 OF 26 HCA COPYRIGHT 2003 ACS on STN

139:247760 Arsenic and Mercury Partitioning in Fly Ash at a Kentucky Power Plant. Sakulpitakphon, Tanaporn; Hower, James C.; Trimble, Alan S.; Schram, William H.; Thomas, Gerald A. (Center for Applied Energy Research, University of Kentucky, Lexington, KY, 40511, USA). Energy & Fuels, 17(4), 1028-1033 (English) 2003. CODEN: ENFUEM. ISSN: 0887-0624. Publisher: American Chemical Society.

AB **Coal** and fly ash samples were collected from a 500-MW unit at a Kentucky power plant, with the objective of studying the distribution of arsenic, mercury, and other trace elements in fly ash. The **coal** feed was low-sulfur, high volatile A bituminous central West Virginia **coal**. The plant produced a relatively low-carbon fly ash. In contrast to power plants with high-mercury feed **coal**, the fly ashes from the

lower-mercury feed **coal** had low mercury values, generally not exceeding 0.01 ppm Hg. **Mercury capture** by fly ash varies with both the amt. and type of carbon and the collection temp.; **mercury capture** is more efficient at lower temps. Arsenic in the feed **coal** and in the **flue gas** is of concern to the utility, because of the potential for catalyst poisoning in the selective catalytic redn. system (in the planning stage at the time of the sampling). Arsenic is captured in the fly ash, increasing in concn. in the more-distant (from the boiler) reaches of the electrostatic precipitator system.

IT **7782-50-5**, Chlorine, analysis
 (in ashed **coal** feed; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 51-18 (Fossil Fuels, Derivatives, and Related Products)
 Section cross-reference(s): 59, 60

ST arsenic mercury partition Bituminous **coal** fly ash power plant

IT Bituminous **coal**
 (arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
 (cutinite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT Oxides (inorganic), analysis
 (in ashed **coal** feed; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
 (inertinite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
 (macrinite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
 (micrinite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
 (microlithotypes, trimacerite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT Iron ores, analysis
 Sulfide ores
 (pyritic, in **coal** feed; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
 (semifusinite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **Coal** components
(sporinite; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT 1305-78-8, Calcium oxide (CaO), analysis 1309-37-1, Iron oxide (Fe2O3), analysis 1309-48-4, Magnesium oxide (MgO), analysis 1313-59-3, Sodium oxide, analysis 1314-56-3, Phosphorus oxide (P2O5), analysis 1344-28-1, Alumina, analysis 7446-11-9, Sulfur trioxide, analysis 7631-86-9, Silica, analysis 12136-45-7, Potassium oxide, analysis 13463-67-7, Titanium oxide (TiO2), analysis
(in ashed **coal** feed and fly ash; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT 7439-97-6, Mercury, analysis 7440-38-2, Arsenic, analysis
(in ashed **coal** feed and fly ash; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

IT **7782-50-5**, Chlorine, analysis
(in ashed **coal** feed; arsenic and mercury partitioning and trace metals in fly ash at Kentucky power plant)

138:275380 Mercury oxidation in **coal**-fired utility boilers: validation of gas-phase kinetic models. Senior, Constance; Chen, Zumao; Sarofim, Adel (Reaction Engineering International, Salt Lake City, UT, 84101, USA). Proceedings of the Air & Waste Management Association's Annual Conference & Exhibition, 95th, Baltimore, MD, United States, June 23-27, 2002, 443-460. Air & Waste Management Association: Pittsburgh, Pa. ISBN: 0-923204-45-8 (English) 2002. CODEN: 69DMAK.

AB **Coal**-fired power plants are major point sources of mercury discharges into the atm. After considerable study of mercury emissions and their impact on the environment, US EPA made a detn. to regulate mercury emissions from **coal**-fired elec. utility boilers. Regulation of mercury emissions may necessitate addnl. air pollution control devices being installed at utility power plants. Before regulations are imposed, it is important to understand the behavior of mercury in existing devices. Extensive measurements of mercury emissions at power plants demonstrated that high levels of removal can occur in existing devices and that the partitioning of mercury between elemental and oxidized forms in the gas plays an important role in **mercury removal**. Also, the effectiveness of proposed methods for mercury control such as injection of powd. activated carbon, depends on the form of mercury in the gas. Oxidn. of elemental mercury as it leaves the combustion zone can occur by homogeneous and heterogeneous pathways. Homogeneous oxidn. appears to be kinetically limited in **coal** -fired boilers and to involve reaction between mercury and chlorine species. The authors describe a kinetic scheme for chlorine and mercury chem. in **flue gas**. The kinetic model for the behavior of chlorine compds. in **flue gas** was validated against exptl. data. The model does a good job of reproducing the evolution of chlorine as a function of residence time. Also, the model reproduces the prodn. of **Cl2** over a

wide range of cooling rates. For the purposes of modeling Hg, the authors need to have the correct compns. of the important chlorine radicals. The paper showed the importance of starting the calcns. at high enough temps. to obtain the correct initial conditions of Cl radical, and the secondary importance of water vapor. The model was used to simulate six different sets of exptl. data in which chlorine and mercury compds. were combined at elevated temps. Comparisons with expts. showed the correct trends and, in many cases, the correct magnitudes. The biggest differences are found at low temps. For the practically important case of **coal** combustion with different **coals** the model performed well.

IT **7782-50-5**, Chlorine, reactions
(mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51

ST mercury oxidn **flue gas** chlorine **coal** fired boiler model

IT Boilers
(**coal**-fired; mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

IT Air pollution
(control; mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

IT **Flue gases**
Metal speciation
Oxidation
Simulation and Modeling, physicochemical
(mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

IT **7782-50-5**, Chlorine, reactions
(mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

IT 7439-97-6, Mercury, reactions
(mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

IT 7647-01-0, Hydrochloric acid, reactions 7732-18-5, Water, reactions 22537-15-1, Chlorine atomic, reactions
(mercury oxidn. in presence of chlorine in **flue gas** of **coal**-fired boilers)

L26 ANSWER 5 OF 26 HCA COPYRIGHT 2003 ACS on STN

138:157911 Iodine room temperature sorbents for **mercury capture** in combustion exhausts. Rodriguez, Sylian J.; Lee, Tai-Gyu; Hedrick, Elizabeth; Biswas, Pratim (Aerosol and Air Quality Research Laboratory, Department of Civil and Environmental

Engineering, University of Cincinnati, Cincinnati, OH, 45221-0071, USA). Proceedings - U.S. EPA-DOE-EPRI Combined Power Plant Air Pollution Control Symposium: The Mega Symposium and the A&WMA Specialty Conference on Mercury Emissions: Fate, Effects, and Control, Chicago, IL, United States, Aug. 21-23, 2001, Volume 2, 38/1-38/13. Air & Waste Management Association: Pittsburgh, Pa. (English) 2001. CODEN: 69DHKF.

AB Novel sorbent processes at room temp. were studied for their feasibility for **mercury capture** in gas streams. During the development of impinger solns. for efficient **removal** of **mercury** for measurement by direct injection nebulization ICP/MS36, potassium iodide solns. are very effective at **capturing** elemental **mercury**. Potassium iodide aerosols, com. available KI crystals and iodine gas highly **removed mercury**. The first phase was to characterize the as generated sorbent particles by structural and morphol. anal., and the second phase focused on the capture efficiencies. Rather high capture efficiencies (> 98%) of elemental mercury were obtained using the potassium iodide sorbent particles, due to the submicrometer particles with high surface area in which Hg vapors were condensed and oxidized. Agglomerated sorbent particles with high surface area per unit mass were generated by nebulizing potassium iodide solns. The **mercury removal** was weakly diminished by the addn. of more Hg in the gas phase, but still high capture efficiencies were obtained (.apprx. 93%). KI crystals com. available were used over a filter and over a mesh, simulating a fixed bed reactor. Efficiencies varied from 72.6% to 93.2%, showing the potential of KI powders to be used as efficient granular sorbents of mercury vapors. Iodine gas, generated from a KI soln. with acidified hydrogen peroxide, also efficiently oxidizes elemental mercury in gas streams, .ltoreq.99.4%.

IT **7553-56-2**, Iodine, reactions
(oxidant; **mercury removal** from combustion **flue gases** using iodine/potassium iodide as sorbent)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I— I

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51

ST **mercury removal** combustion **flue gas** iodine potassium iodide sorption

IT Aerosols
(KI; **mercury removal** from combustion **flue gases** using iodine/potassium iodide as sorbent)

IT Air pollution
(control; **mercury removal** from combustion

flue gases using iodine/potassium iodide as
sorbent)

IT **Coal**, uses
(**flue gas** from combustion of; **mercury**
removal from combustion **flue gases**
using iodine/potassium iodide as sorbent)

IT **Flue gases**
(incinerator; **mercury removal** from combustion
flue gases using iodine/potassium iodide as
sorbent)

IT **Filters**
Flue gases
Sorption
(**mercury removal** from combustion **flue**
gases using iodine/potassium iodide as sorbent)

IT 7439-97-6, **Mercury**, processes
(**mercury removal** from combustion **flue**
gases using iodine/potassium iodide as sorbent)

IT **7553-56-2**, Iodine, reactions
(oxidant; **mercury removal** from combustion
flue gases using iodine/potassium iodide as
sorbent)

IT 7722-84-1, Hydrogen peroxide, reactions
(oxidant; **mercury removal** from combustion
flue gases using iodine/potassium iodide as
sorbent)

IT 7681-11-0, Potassium iodide, uses
(sorbent; **mercury removal** from combustion
flue gases using iodine/potassium iodide as
sorbent)

L26 ANSWER 6 OF 26 HCA COPYRIGHT 2003 ACS on STN

138:157898 **Mercury** emissions and **removal** during co-firing of **coal**, wood and wastes. Kouvo, Petri; Korelin, Toni; Savola, Tuula (Fortum Power and Heat, Vantaa, 00048, Finland). Proceedings - U.S. EPA-DOE-EPRI Combined Power Plant Air Pollution Control Symposium: The Mega Symposium and the A&WMA Specialty Conference on Mercury Emissions: Fate, Effects, and Control, Chicago, IL, United States, Aug. 21-23, 2001, Volume 2, 5/1-5/13. Air & Waste Management Association: Pittsburgh, Pa. (English) 2001. CODEN: 69DHKF.

AB Interest on reducing Hg emissions rose in the USA after USEPA decided Hg emissions from power plants will be regulated. Also, the European Union proposal for a waste combustion directive would regulate Hg emissions from waste incinerators and co-combustion. Hg emissions are esp. interesting when fuels with different qualities are co-fired. Co-firing refuse-derived fuel (RDF) and wood in a pilot-scale bubbling fluidized bed (BFB) boiler and co-firing **coal** and wood in a full-scale pulverized **coal** -fired boiler were studied. These studies detd. changes in Hg emissions and performance of **flue gas** cleaning equipment during co-combustion. Co-firing expts. with RDF and wood

were made at a pilot-scale BFB plant equipped with fabric filter. During expts. **Hg removal** in fabric filter increased significantly as RDF and Hg content in the fuel mixt. increased. This was mainly due to high Cl concns. in RDF, resulting in high ratios of oxidized Hg species. Injecting $CaCO_3$ into the **flue gas** duct significantly increased the ratio of particulate Hg upstream from the fabric filter. The effect of **coal** and wood co-firing on Hg emissions was experimented at a 315 MWfuel pulverized **coal**-fired unit with an electrostatic precipitator and a wet **flue gas** desulfurization plant. During the expts. Hg emissions decreased clearly, .apprx.20%, when some of **coal** (4% of fuel energy input) was replaced with wood. The most important reason for the redn. was the usually lower Hg concn. in wood fuel vs. **coal** ; however, increased **Hg removal** in the wet **flue gas** desulfurization plant was obsd. during wood co-firing.

IT **7782-50-5**, Chlorine, occurrence
(**flue gas** contg.; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 43, 51, 60

ST **flue gas** mercury **coal** wood refuse derived fuel cocombustion; pulverized **coal** fired boiler wood **coal** cocombustion; bubbling fluidized bed boiler wood refuse derived fuel cocombustion; cocombustion **flue gas** cleaning equipment performance; calcium carbonate injection **flue gas** mixed fuel combustion; chlorine effect **mercury removal** mixed fuel combustion **flue gas**; fabric **filter** wet **scrubbing mercury removal** combustion **flue gas**

IT **Filters**
(fabric, **mercury removal** in; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT **Flue gases**
(**flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT Wet **scrubbing**
(**mercury removal** by; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT Furnace firing
(mixed fuel; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT Sawdust
Wood
(refuse-derived fuel co-combustion with; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT Refuse derived fuels
(wood co-combustion with; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT **Coal**, uses
(wood co-combustion with; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT **7782-50-5**, Chlorine, occurrence
(**flue gas** contg.; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT 7439-97-6, Mercury, processes
(gaseous and particulate; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

IT 471-34-1, Calcium carbonate, uses
(sorbent; injection of; **flue gas** mercury **emissions** and air pollution control equipment removal during co-firing of **coal**, wood, and refuse-derived fuels in bubbling fluidized bed and pulverized **coal** boilers)

L26 ANSWER 7 OF 26 HCA
138:157801 The determination of mercury species in a bench scale

coal combustor using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry analysis. Hedrick, Elizabeth; Biswas, Pratim; Lee, Tai Gyu; Zhuang, Ye (U.S. EPA, USA). Proceedings of the Air & Waste Management Association's Annual Conference & Exhibition, 94th, Orlando, FL, United States, June 24-28, 2001, 1457-1470. Air & Waste Management Association: Pittsburgh, Pa. ISBN: 0-923204-39-3 (English) 2001. CODEN: 69DMIS.

AB Hg emissions from **coal** utilities are difficult to control. **Hg** eludes **capture** by most air pollution control devices (APCDs). To det. the gaseous Hg species in stack gases, U.S. EPA Method 5 type sampling was used. In this type of sampling a hole is drilled into the stack wall and a vol. of gas is isokinetically drawn through a heated probe, through a filter to remove particulate, and finally through gas-scrubbing solns. designed to selectively **capture** the gaseous **Hg** species of interest. Gaseous speciation is achieved by selective, sequential capture in the impinger solns. Anal. of **Hg** on the **filter** and in the impinger solns. is done by oxidn. of all Hg species followed by cold vapor at. absorption spectrometry (CVAA) anal. A drawback to this type of anal. scheme is that there are no ref. methods capable of both Hg speciation and multiple metals anal. since the solns. typically used for **Hg** **capture** are not amenable to low-level metals techniques like ICP-MS. This can double the cost of study designed to gather Hg and multiple metals data since two sep. sampling and anal. methods must be used. In previous research the authors developed an impinger sampling train for Hg speciation using inductively coupled plasma mass spectrometry (ICP/MS) with direct injection nebulization (DIN) with the potential for performing multiple metals detns. on the same solns. In the current work the authors demonstrate the Hg speciation sampling and anal. method using a bench scale **coal** combustor and compare the results to the Ontario Hydro Method, and demonstrate the capability of performing low-level Hg detn. in addn. to low-level anal. of Pb, Cd, Ba, Cr, Cu, Mn, Ni, Se, V and Zn.

IT **7553-56-2**, Iodine, analysis
(the detn. of mercury species in a bench scale **coal** combustor using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry anal.)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

CC 59-1 (Air Pollution and Industrial Hygiene)

ST mercury detn **coal** combustor iodine based impinger ICP MS

IT Mass spectrometry
(inductively coupled plasma; the detn. of mercury species in a bench scale **coal** combustor using iodine based impingers

and direct injection nebulization - inductively coupled plasma mass spectrometry anal.)

IT Combustion apparatus
Flue gases
(the detn. of mercury species in a bench scale **coal** combustor using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry anal.)

IT **Coal**, processes
(the detn. of mercury species in a bench scale **coal** combustor using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry anal.)

IT 7439-97-6, Mercury, analysis
(the detn. of mercury species in a bench scale **coal** combustor using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry anal.)

IT **7553-56-2**, Iodine, analysis
(the detn. of mercury species in a bench scale **coal** combustor using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry anal.)

L26 ANSWER 8 OF 26 HCA

138:141480 Analysis of ICR data for **mercury removal** from wet and dry FGD. Weilert, Carl V.; Randall, Douglas W. (Burns & McDonnell, Kansas City, MO, 64114, USA). Proceedings - U.S. EPA-DOE-EPRI Combined Power Plant Air Pollution Control Symposium: The Mega Symposium and the A&WMA Specialty Conference on Mercury Emissions: Fate, Effects, and Control, Chicago, IL, United States, Aug. 21-23, 2001, Volume 1, 45/1-45/15. Air & Waste Management Association: Pittsburgh, Pa. (English) 2001. CODEN: 69DHKF.

AB USEPA posted summaries of Hg emission test data from the Information Collection Rule (ICR) for elec. utility units indicated a wide range of **Hg removal** efficiency for wet and dry **flue gas** desulfurization (FGD) systems. For example, total **Hg removal** efficiency for units equipped with dry scrubbers reportedly was from <9 to >98%. The range of efficiencies reported for units equipped with wet FGD systems was from <13 to >96%. For utilities contemplating construction of new **coal**-fired steam-elec. generating units, uncertainty raised by the posted data summaries is problematic. Results of a review of ICR data conducted to evaluate possible reasons for the disparity among **Hg removal** efficiency within populations of wet and dry FGD systems tested are presented. Variables evaluated included fuel parameters (**coal** rank, S, moisture, ash, Cl, Hg) and stack gas parameters (Hg speciation, O2 content). Major factors to explain variations in **Hg removal** efficiency performance from one FGD system to another included **coal** rank and Hg speciation in **flue gas** entering the

FGD system.
IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51
ST **mercury removal** wet dry **flue gas** desulfurization system; **coal** fired power generation **flue gas** mercury **emission**; fuel property **flue gas** compn effect **mercury removal** desulfurization
IT Standards, legal and permissive
(air quality; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)
IT Ashes (residues)
(**coal** contg.; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)
IT **Flue gas** desulfurization
Flue gases
Wet scrubbing
(**coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)
IT Power
(**coal**-fired generation of; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)
IT Air pollution
(control; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT **Filters**
(fabric, **mercury removal**; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT Metal speciation
(mercury; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT Bituminous **coal**
Lignite
Subbituminous **coal**
(power generation from combustion of; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT Absorption
(spray dryer; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT 7704-34-9, Sulfur, occurrence **7782-50-5**, Chlorine, occurrence
(**coal** contg.; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT 7446-09-5, Sulfur dioxide, processes 14302-87-5, Hg2+, processes
(**coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

IT 7439-97-6, Mercury, processes
(elemental and particulate; **coal** properties and **flue gas** compn. effect on **mercury removal** from **coal**-fired power generation **flue gas** in wet and dry desulfurization systems detd. by analyzing Information Collection rule data)

L26 ANSWER 9 OF 26 HCA COPYRIGHT 2003 ACS on STN
138:141479 Assessment of **mercury removal** by existing air pollution control devices in full scale power plants. Afonso, Rui F.; Senior, Constance L. (Energy and Environmental Strategies, MA, USA). Proceedings - U.S. EPA-DOE-EPRI Combined Power Plant Air

Pollution Control Symposium: The Mega Symposium and the A&WMA Specialty Conference on Mercury Emissions: Fate, Effects, and Control, Chicago, IL, United States, Aug. 21-23, 2001, Volume 1, 44/1-44/17. Air & Waste Management Association: Pittsburgh, Pa. (English) 2001. CODEN: 69DHKF.

AB **Coal**-fired power facilities are major point sources of Hg discharges to the atm. USEPA regulates Hg emissions, necessitating controls on some utility boilers. The USEPA Hg Information Collection Request (ICR) initiated in 1999 was designed to provide data to help make future regulatory detns. to control Hg emissions from **coal**-fired power facilities. Phase III of this effort involved a plant testing program for Hg emissions, including Hg speciation from **coal**-fired power facilities. More than 80 facilities were statistically selected for this testing based on several factors, including boiler type, air pollution control equipment configuration, and fuel type. For each facility, Hg concns. were measured in **coal** (along with other **coal** compn. data) and **flue gas**. **Flue gas** measurements were conducted at the stack and inlet to the last air pollution control device (APCD) using the Ontario Hydro method, providing Hg speciation data (elemental, oxidized, particulate-bound). A simple model for Hg transformations in **coal**-fired power plants was devised to predict Hg concn. and speciation within APCD and at the stack. This model used a kinetic approach to predict oxidn. of gas-phase Hg in the convective section, based on key Hg reactions in **flue gas**. ICR data on Hg speciation in **flue gas**, **coal** compn., and boiler design and operation were examd. to assess trends in the behavior of Hg in **coal**-fired power facilities. Hg speciation at the inlet to particulate control devices depended on **coal** Cl content and on the temp. at the inlet to the device. Wet **flue gas** desulfurization, dry scrubbers, and fabric filters can all remove a significant amt. (50-90%) of Hg from **flue gas** under certain conditions. Crit. information was missing from ICR data, particularly fly ash compn.; lack of this information reduced model prediction quality.

IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51

ST modeling **mercury removal** existing air pollution

control device; **coal** fired power generation facility
mercury removal flue gas;
speciation mercury **coal** fired power generation
flue gas

IT Standards, legal and permissive
(air quality; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Ashes (residues)
(**coal** contg.; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal** -fired power generation **flue gas** by air pollution control devices)

IT Power
(**coal**-fired generation of; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT **Flue gases**
(**coal**-fired power generation; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Air pollution
(control; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Absorption
Scrubbers
(dry; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Filters
(fabric; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Electrostatic precipitation apparatus
(hot- and cold-side; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution

control devices)

IT Metal speciation
(mercury; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT **Flue gas** desulfurization
Simulation and Modeling, physicochemical
(model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Bituminous **coal**
Lignite
Subbituminous **coal**
(power generation; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT Scrubbers
(wet; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal** -fired power generation **flue gas** by air pollution control devices)

IT 7439-97-6, Mercury, occurrence
(elemental; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

IT 7446-09-5, Sulfur dioxide, processes
(**flue gas**; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal** -fired power generation **flue gas** by air pollution control devices)

IT 7647-01-0, Hydrogen chloride, occurrence 11104-93-1, Nitrogen oxide, occurrence
(**flue gas**; model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal** -fired power generation **flue gas** by air pollution control devices)

IT 14302-87-5, Hg2+, occurrence
(model assessment of **coal** property, temp., reaction time, and facility operations effect on mercury speciation in and removal from full-scale, **coal**-fired power generation **flue gas** by air pollution control devices)

L26 ANSWER 10 OF 26 HCA COPYRIGHT 2003 ACS on STN
138:141465 Wet electrostatic precipitation demonstrating multiple pollutant control in industrial applications holds promise for **coal**-fired utility emission reduction of acid mist, PM2.5 and mercury. Altman, Ralph; Buckley, Wayne; Ray, Isaac (EPRI, USA). Proceedings - U.S. EPA-DOE-EPRI Combined Power Plant Air Pollution Control Symposium: The Mega Symposium and the A&WMA Specialty Conference on Mercury Emissions: Fate, Effects, and Control, Chicago, IL, United States, Aug. 21-23, 2001, Volume 2, 29/1-29/10. Air & Waste Management Association: Pittsburgh, Pa. (English) 2001. CODEN: 69DHKF.

AB Wet electrostatic pptn. (ESP) technol. is used in industrial applications to control acid mists, sub-micron particulate, Hg, metals, and dioxins/furans as a final polishing device in a multi-pollutant air pollution control system. Test results from facilities meeting new USEPA max. achievable control technol. stds. demonstrated .gtoreq.99.9% removal efficiency and 0 opacity. How wet ESP work, what configurations they come in, design considerations, and how this technol. is being piloted in **coal**-fired utilities to control SO3 and PM2.5 emissions is also discussed.

IT **7782-50-5**, Chlorine, processes
(wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51

ST wet electrostatic precipitator **flue gas** pollutant **emission** control; **coal** fired power generation **flue gas** pollutant **emission** control; acid mist particulate matter **mercury removal flue gas**

IT Power
(**coal**-fired generation of; wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

IT **Flue gases**
(**coal**-fired power generation; wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

IT **Coal**, uses
(power generation from combustion of; wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

IT Particles
(wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

IT Metals, processes
(wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

IT Electrostatic precipitation apparatus
(wet; tubular or plate; wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

IT 132-64-9D, Dibenzofuran, chloro derivs. 262-12-4D, Dibenzo-p-dioxin, chloro derivs. 7439-92-1, Lead, processes 7439-97-6, Mercury, processes 7440-47-3, Chromium, processes 7446-09-5, Sulfur dioxide, processes 7446-11-9, Sulfur trioxide, processes 7647-01-0, Hydrogen chloride, processes 7664-93-9, Sulfuric acid, processes **7782-50-5**, Chlorine, processes
(wet electrostatic pptn. to control multiple pollutant emissions in **coal**-fired power generation **flue gas**)

L26 ANSWER 11 OF 26 HCA COPYRIGHT 2003 ACS on STN

138:111299 A method and a device for the separation of sulphur dioxide from a gas. Bengtsson, Sune; Johanson, Lars-Erik; Nolin, Kjell; Maripuu, Mati (Alstom (Switzerland) Ltd., Switz.). PCT Int. Appl. WO 2003004137 A1 20030116, 34 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-SE1333 20020704. PRIORITY: SE 2001-2412 20010705.

AB A device for sepg. sulfur dioxide from a gas has an inlet for the gas and an outlet for gas, from which sulfur dioxide has been sepd. An apertured plate is arranged between the inlet and the outlet and allows the gas to pass from below. On its upper side, the apertured plate supports a flowing layer of absorption liq. An inlet duct connects a container for absorption liq. to the upper side of the apertured plate. A means conveys the absorption liq. from the container, through the inlet duct, to the upper side of the apertured plate and along the apertured plate. The device also has an outlet box for collecting the absorption liq. flowing over the apertured plate and at least one distribution means, which is

arranged to contact the gas which is supplied to the device through the inlet with the liq. flowing from the outlet box to the container before the gas passes through the apertured plate. The device can be used with: boiler firing with **coal**, oil, peat, biofuel and waste, such as industrial and domestic waste; metallurgical processes, such as steel and copper making processes; concrete prodn. processes and refining processes, such as oil refinement and natural gas refinement. The device can also be used for absorbing other substances together with sulfur dioxide, including: hydrogen halogenides, such as hydrogen chloride, hydrogen fluoride, hydrogen bromide and hydrogen iodide; bromine; heavy metals, such as mercury; and other compds.

IT **7439-97-6**, **Mercury**;, processes **7726-95-6**
, Bromine;, processes
(**removed** together with SO_2; a method and a device for the sepn. of sulfur dioxide from a gas)

RN 7439-97-6 HCA
CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

RN 7726-95-6 HCA
CN Bromine (8CI, 9CI) (CA INDEX NAME)

Br—Br

IC ICM B01D053-50
ICS B01D053-78
CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 47
ST **flue gas** desulfurization absorption lime limestone apertured plate; sulfur dioxide removal **flue gas** absorption lime apertured plate
IT Absorption
Flue gas desulfurization
(absorptive method and device for sepn. of SO_2 from a gas)
IT **Flue gases**
(boiler, desulfurization of; absorptive method and device for sepn. of SO_2 from a gas)
IT Metallurgy
Petroleum refining
(desulfurization of **flue gases** from; absorptive method and device for sepn. of SO_2 from a gas)
IT Concrete
(prodn., desulfurization of **flue gases** from; absorptive method and device for sepn. of SO_2 from a gas)
IT **7439-97-6**, **Mercury**;, processes 7647-01-0, Hydrogen chloride, processes 7664-39-3, Hydrogen fluoride, processes **7726-95-6**, Bromine;, processes 10034-85-2, Hydrogen iodide 10035-10-6, Hydrogen bromide, processes

(**removed** together with SO2; a method and a device for the sepn. of sulfur dioxide from a gas)

L26 ANSWER 12 OF 26 HCA COPYRIGHT 2003 ACS on STN

137:357251 The fate and behavior of mercury in **coal**-fired power plants. Meij, Ruud; Vredenbregt, Leo H. J.; te Winkel, Henk (KEMA Power Generation and Sustainables, Arnhem, Neth.). Journal of the Air & Waste Management Association, 52(8), 912-917 (English) 2002. CODEN: JAWAFC. ISSN: 1096-2247. Publisher: Air & Waste Management Association.

AB For the past 22 yr in the Netherlands, the behavior of Hg in **coal**-fired power plants has been studied extensively. **Coal** from all over the world is fired in Dutch power stations. First, the Hg concns. in these **coals** were measured. Second, the fate of the Hg during combustion was established by performing mass balance studies. On av., 43 .+-. 30% of the Hg was present in the **flue gases** downstream of the electrostatic precipitator (ESP; dust collector). In individual cases, this figure can vary between 1 and 100%. Important parameters are the Cl content of the fuel and the **flue gas** temp. in the ESP. On av., 54 .+-. 24% of the gaseous **Hg** was **removed** in the wet **flue-gas** desulfurization (FGD) systems, which are present at all Dutch **coal**-power stations. In individual cases, this removal can vary between 8% (outlier) and 72%. On av., the fate of Hg entering the power station in the **coal** was as follows: <1% in the bottom ash, 49% in the pulverized fuel ash (ash collected in the ESP), 16.6% in the FGD gypsum, 9% in the sludge of the wastewater treatment plant, 0.04% in the **effluent** of the wastewater treatment plant, 0.07% in fly dust (leaving the stack), and 25% as gaseous Hg in the **flue gases** and **emitted** into the air. The distribution of Hg over the streams leaving the FGD depends strongly on the installation. On av., 75% of the **Hg** was **removed**, and the final concn. of Hg in the **emitted flue gases** of the Dutch power stations was only .apprx.3 .mu.g/mSTP3 at 6% O2. During co-combustion with biomass, the **removal** of **Hg** was similar to that during 100% **coal** firing. Speciation of Hg is a very important factor. An oxidized form (HgCl2) favors a high degree of removal. The conversion from Hg0 to HgCl2 is pos. correlated with the Cl content of the fuel. A catalytic DENOX (SCR) favors the formation of oxidized Hg, and, in combination with a wet FGD, the total removal can be as high as 90%.

IT **7782-50-5**, Chlorine, occurrence
(effects on fate and behavior of mercury in **coal**-fired power plants)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
ST chlorine effect mercury fate behavior **coal** fired power plant
IT Air pollution
Combustion
(fate and behavior of mercury in **coal**-fired power plants)
IT **Coal**, reactions
(fate and behavior of mercury in **coal**-fired power plants)
IT Power
(plants, **coal**-fired; fate and behavior of mercury in)
IT 7782-50-5, Chlorine, occurrence
(effects on fate and behavior of mercury in **coal**-fired power plants)
IT 7439-97-6, Mercury, processes
(fate and behavior of mercury in **coal**-fired power plants)

L26 ANSWER 13 OF 26 HCA COPYRIGHT 2003 ACS on STN
137:173821 **Flue gas** Hg measurements from **coal**-fired boilers equipped with wet scrubbers. DeVito, M. S.; Withum, J. A.; Statnick, R. M. (Research and Development, CONSOL Energy Inc., South Park, PA, 15129, USA). International Journal of Environment and Pollution, 17(1/2), 126-142 (English) 2002. CODEN: IJVLEN. ISSN: 0957-4352. Publisher: Inderscience Enterprises Ltd..
AB USEPA indicated it is considering addnl. SO2 and NOx emission redns., and is under a consent agreement to propose Hg redn. regulations by 2004 for the utility industry. Boiler manufacturers and the utility industry developed improved combustion modification techniques to reduce NOx emissions. These advanced combustion modification techniques plus selective catalytic redn. (SCR) offer the potential to reduce NOx emissions at reduced cost. Wet and dry **flue gas** desulfurization (FGD) systems have been shown to reduce SO2 emissions by .ltoreq.95%. CONSOL showed that conventional wet FGD and electrostatic precipitator (ESP) systems can remove an av. of 67 .+-. 6% of inlet Hg. These data showed utility boilers equipped with ESP-scrubber combinations are removing 2/3 of Hg in as-fired **coal** at no added cost. Hg speciation data showed that 80-95% of oxidized Hg, as detd. by the Ontario Hydro method, is removed by the scrubber. The av. Hg material balance closure at 6 facilities was 103 .+-. 8%. **Hg removed** by **scrubbing** is deposited in the scrubber byproduct. Std. leachate testing conducted on fixed and un-fixed scrubber byproduct from 1 test showed no Hg leaching. Hg volatility was evaluated by heating scrubber byproduct 140.degree.F for 11 wk. After 11 wk, no Hg loss was reported. Based on these results, there may be combinations of environmental control systems which can achieve significant SO2, NOx, and Hg redns. at lower cost than a conventional approach using 3 add-on processes: FGD for SO2 control, selective catalytic redn. for NOx

control, and C injection for Hg control.
IT 7782-50-5, Chlorine, occurrence
(coal; mercury removal from coal-fired power generation flue gas by wet scrubbing flue gas desulfurization and by combined electrostatic precipitators-wet flue gas desulfurization)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51, 60
ST flue gas emission coal fired power generation USA; sulfur dioxide removal flue gas wet scrubbing desulfurization; nitrogen oxide removal flue gas selective catalytic redn; mercury removal flue gas lime wet scrubbing electrostatic precipitator
IT Ashes (residues)
(coal fly; mercury removal from coal-fired power generation flue gas by wet scrubbing flue gas desulfurization and by combined electrostatic precipitators-wet flue gas desulfurization)
IT Power
(coal-fired generation of; mercury removal from coal-fired power generation flue gas by wet scrubbing flue gas desulfurization and by combined electrostatic precipitators-wet flue gas desulfurization)
IT Flue gases
(coal-fired power generation; mercury removal from coal-fired power generation flue gas by wet scrubbing flue gas desulfurization and by combined electrostatic precipitators-wet flue gas desulfurization)
IT Ashes (residues)
Volatile substances
(coal; mercury removal from coal-fired power generation flue gas by wet scrubbing flue gas desulfurization and by combined electrostatic precipitators-wet flue gas desulfurization)
IT Air pollution
(control; mercury removal from coal-fired power generation flue gas by wet scrubbing flue gas desulfurization and by combined electrostatic precipitators-wet flue gas desulfurization)

IT Sludges
(**flue gas** desulfurization; **mercury** in; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT Metal speciation
(**flue gas mercury**; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT Wet **scrubbing**
(lime slurry; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT Leaching
(mercury from sludge; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT Electrostatic precipitation apparatus
Flue gas desulfurization
(**mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT **Coal**, uses
(power generation from combustion of; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT Reduction
(selective catalytic; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT Lime (chemical)
(wet **scrubbing** with; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT 1333-74-0, Hydrogen, occurrence 7440-44-0, Carbon, occurrence
7727-37-9, Nitrogen, occurrence 7782-41-4, Fluorine, occurrence

7782-44-7, Oxygen, occurrence **7782-50-5**, Chlorine, occurrence
(**coal**; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT 7704-34-9, Sulfur, occurrence
(**coal**; total, pyritic, sulfate, and org.; **mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT 7439-97-6, **Mercury**, processes 7446-09-5, Sulfur dioxide, processes
(**mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

IT 11104-93-1, Nitrogen oxide, processes
(**mercury removal** from **coal**-fired power generation **flue gas** by wet scrubbing **flue gas** desulfurization and by combined electrostatic precipitators-wet **flue gas** desulfurization)

L26 ANSWER 14 OF 26 HCA COPYRIGHT 2003 ACS on STN

137:173707 Modeling of mercury states in **coal**-fired utility boilers. Chen, Z.; Senior, C. L.; Sarofim, A. F. (Reaction Engineering International, Salt Lake City, UT, 84101, USA). Proceedings of the International Technical Conference on Coal Utilization & Fuel Systems, 27th(Vol. 1), 549-560 (English) 2002. CODEN: PTCSFT. Publisher: Coal Technology Association.

AB Gas-phase oxidized mercury, particularly $HgCl_2$, is captured in wet scrubbers in combustion systems, while elemental mercury cannot. There is a wide range in the measured **mercury capture** efficiencies in scrubbers since the amt. of conversion of elemental mercury to oxidized mercury is a function of the chlorine content of the combustion gases and the temp. history. In order to look at the effects of realistic conditions in utility power plants, we created an av. time-temp. history based on a computational fluid dynamic (CFD) model of an actual **coal** -fired boiler. Results of the model in terms of fraction of elemental mercury in the **flue gas** at the air preheater outlet were compared with measured data. The model showed the correct trends of mercury oxidn. as a function of **coal** chlorine content. The oxidn. of elemental mercury was predicted to begin in the economizer and continue through the air preheater. The extent of oxidn. was related to the concn. of chlorine radical in the economizer, which was influenced by the cooling rate across the

economizer. Cooling rate and residence time in the **flue gas** in the temp. range from 900 K to 450 K (1160 F to 350 F) largely det. gas-phase mercury oxidn. Adding a long residence-time isothermal section after the economizer can increase the amt. of mercury oxidn. via gas-phase reactions. The modeling results suggest that gas-phase oxidn. may be responsible for some of the obsd. mercury oxidn. across SCR systems.

IT **7782-50-5**, Chlorine, reactions
    (oxidn. of mercury as function of **coal** chlorine content in modeling of mercury states in **coal**-fired utility boilers)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl— Cl

CC 59-2 (Air Pollution and Industrial Hygiene)
    Section cross-reference(s): 51

ST air pollution modeling mercury state **coal** fired utility boiler

IT Boilers
    (**coal**-fired, utility; modeling of mercury states in).

IT Simulation and Modeling, physicochemical
    (computational fluid dynamics; of mercury states in **coal**-fired utility boilers)

IT Fluid dynamics
    (computational; of mercury states in **coal**-fired utility boilers)

IT Fuels
    (fossil; modeling of mercury states in **coal**-fired utility boilers)

IT Oxidation
    (gas-phase; of mercury as function of **coal** chlorine content in modeling of mercury states in **coal**-fired utility boilers)

IT Air pollution
    Flue gases
    (modeling of mercury states in **coal**-fired utility boilers)

IT **Coal**, uses
    (modeling of mercury states in **coal**-fired utility boilers)

IT Combustion
    (modeling of mercury states in **coal**-fired utility boilers and **mercury** chloride **captured** in wet scrubbers in combustion systems)

IT Power
    (plants; modeling of mercury states in **coal**-fired utility boilers)

IT Scrubbers
    (wet; modeling of mercury states in **coal**-fired utility

boilers)

IT 7439-97-6, Mercury, reactions
(modeling of mercury states in **coal**-fired utility
boilers)

IT 7487-94-7, Mercury chloride ($HgCl_2$), occurrence
(modeling of mercury states in **coal**-fired utility
boilers and **mercury** chloride **captured** in wet
scrubbers in combustion systems)

IT **7782-50-5**, Chlorine, reactions
(oxidn. of mercury as function of **coal** chlorine content
in modeling of mercury states in **coal**-fired utility
boilers)

L26 ANSWER 15 OF 26 HCA COPYRIGHT 2003 ACS on STN

136:10056 The effect of low-NOx burner operation on mercury emissions, speciation, and removal at a **coal** fired boiler equipped with wet FGD. DeVito, Matthew S. (Research & Development, CONSOL Inc., Library, PA, 15129, USA). Proceedings - Annual International Pittsburgh Coal Conference, 17th, 1278-1292 (English) 2000. CODEN: PICNE4. ISSN: 1075-7961. Publisher: Pittsburgh Coal Conference, University of Pittsburgh.

AB In a 1998 study co-funded by CONSOL Energy Inc., the Ohio **Coal** Development Office and the US Department of Energy, **Hg** emissions and **removal** from an eastern bituminous **coal**-fired boiler operating with conventional pulverized **coal** burners and equipped with a wet **flue gas** desulfurization (FGD) system, were measured. Results demonstrated a total **Hg removal** (across the electrostatic precipitator [ESP] and FGD process) for this unit of 64%, with 58% removal attributed to the FGD. At the FGD inlet, 70-75% of Hg was in the oxidized form. Hg redn. across the FGD was attributed to the **removal** of oxidized **Hg**. Hg material balance closures were excellent and confirmed that most of the **Hg removed** from **flue gas** were in FGD solids, with a small percentage in ESP ash. Leaching and volatility tests conducted on these solids showed the Hg was stable. In 1999, the utility installed low-NOx burners, which reduced NOx emissions by modifying combustion conditions. This is accomplished by staging the introduction of combustion air in and around the burner. Combustion staging modifies the flame temp. profile, which impacts thermal NOx formation. In theory, low-NOx burners can affect Hg emissions by altering the oxidized:elemental Hg ratio. Changes in Hg speciation will affect the **Hg removal** across FGD systems. In some low-NOx burner installations, the C content of fly ash increases. This could result in addnl. **Hg capture** across the particulate control device. Since many utilities are installing low-NOx burners as part of their NOx compliance strategy, it is crit. to det. the effect of the burners on **Hg** speciation, **removal**, and FGD chem. In Sept. 1999, a second Hg emission measurement program was conducted at the host utility. With the exception of retrofitted low-NOx burners, all

other system components remained const. This measurement program included **Hg** speciation, **Hg removal**
across the ESP and FGD, Hg emissions, and Hg volatility and leachability in scrubber sludge. Results and a comparison to previous results are discussed.

IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51, 60

ST low nitrogen oxide burner effect **coal** combustion **flue gas**; **mercury** emission speciation **removal coal** combustion **flue gas**; wet **flue gas** desulfurization **mercury removal coal** combustion gas; electrostatic precipitator **mercury removal coal** combustion **flue gas**

IT Metal speciation
(**coal** combustion mercury; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Ashes (residues)
(**coal** fly; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Power
(**coal**-fired generation of; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Air pollution
(control; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Ashes (residues)
(electrostatic precipitator; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Sludges
(**flue gas** desulfurization; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Electrostatic precipitation apparatus
(low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Burners
(low-nitrogen oxide; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT **Flue gases**
(mercury in; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Mass balance
(mercury; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT Bituminous **coal**
(power generation; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT **Flue gas** desulfurization
(wet; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT 1305-78-8, Calcium oxide, occurrence 1309-48-4, Magnesium oxide, occurrence 1344-28-1, Alumina, occurrence 7631-86-9, Silica, occurrence 11088-95-2, Iron oxide (FeO3) 12136-45-7, Potassium oxide, occurrence
(**coal** ash contg.; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal** -fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT 1333-74-0, Hydrogen, occurrence 7704-34-9, Sulfur, occurrence 7727-37-9, Nitrogen, occurrence 7782-44-7, Oxygen, occurrence **7782-50-5**, Chlorine, occurrence
(**coal** contg.; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal** -fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT 124-38-9, Carbon dioxide, occurrence 7446-09-5, Sulfur dioxide,

occurrence 11104-93-1, Nitrogen oxide, occurrence
(low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT 7439-97-6, Mercury, processes
(low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

IT 7440-44-0, Carbon, reactions
(unburned **coal** fly ash; low-nitrogen oxide burners effect on mercury emissions, speciation, and removal from **coal**-fired boilers equipped with wet **flue gas** desulfurization and electrostatic precipitator systems)

L26 ANSWER 16 OF 26 HCA COPYRIGHT 2003 ACS on STN

136:10010 Mercury control by injection of activated carbon. Hargis, Richard A.; O'Dowd, William J.; Pennline, Henry W. (National Energy Technology Laboratory, U.S. Department of Energy, Pittsburgh, PA, 15236, USA). Proceedings - Annual International Pittsburgh Coal Conference, 17th, 1235-1252 (English) 2000. CODEN: PICNE4. ISSN: 1075-7961. Publisher: Pittsburgh Coal Conference, University of Pittsburgh.

AB Inhouse research at the National Energy Technol. Lab. (NETL) in the air toxics area has been directed at characterizing an existing pilot unit for distribution and fate of hazardous air pollutants, including Hg. This pilot unit is a 500-lb/h **coal** combustion system which includes a furnace, air pre-heater, ductwork, and pulse-jet fabric filter. Previous testing was conducted to evaluate Hg sampling and speciation methods. More recently, tests were conducted to initiate operation of a sorbent injection system. Following successful shakedown of the sorbent injection system, testing was conducted with a low-S (.apprx.1%) bituminous **coal**. Hg measurements were made using the ASTM draft Hg speciation (Ontario-Hydro) method and a total Hg measurement method (EPA Method 101A). For comparison, measurements were also made with a continuous emissions monitor and a solid sorbent sampling technique. Results presented are from test conditions with injection of Norit Darco activated C (AC) at various sorbent:Hg mass ratios (.apprx.1,800:1 to .apprx.10,300:1) and Calgon FluePac at ratios of 2,600:1 and 5,200:1. Three av. baghouse temps. were studied: 250, 270, and 300.degree.F. Results included **Hg removal** efficiency, vapor-solid distribution, speciation, and material balances. Future testing is planned to continue with Norit Darco and other activated C and novel sorbents.

IT **7782-50-5**, Chlorine, occurrence
(**coal** contg.; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected

activated carbon sorbent)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-2 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51, 60
ST **coal** combustion **flue gas** mercury control; activated carbon injection **flue gas** mercury control; sorbent injection **flue gas** mercury control
IT Filters
(bags; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)
IT Mass balance
Metal speciation
(**coal** combustion **flue gas** **mercury**; temp., baghouse **filter** parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)
IT **Flue gases**
(**coal** combustion; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)
IT Ashes (residues)
(**coal** contg.; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)
IT Ashes (residues)
(**coal** fly; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)
IT Power
(**coal**-fired generation of; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)
IT Bituminous **coal**
(low-sulfur; power generation from combustion of; temp., baghouse

filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)

IT 7440-44-0, Carbon, uses
(activated; sorbent; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)

IT 1333-74-0, Hydrogen, occurrence 7704-34-9, Sulfur, occurrence 7727-37-9, Nitrogen, occurrence 7782-44-7, Oxygen, occurrence 7782-50-5, Chlorine, occurrence
(**coal** contg.; temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)

IT 7439-97-6, Mercury, processes
(temp., baghouse filter parameters, combustor operating conditions, and fly ash **coal** content effect on **mercury removal** from **coal** combustion **flue gas** by injected activated carbon sorbent)

L26 ANSWER 17 OF 26 HCA COPYRIGHT 2003 ACS on STN
134:299840 The capture and determination of mercury species from **coal** combustion emissions using iodine based impingers and direct injection nebulization - inductively coupled plasma mass spectrometry analysis. Hedrick, Elizabeth (U.S. EPA, Cincinnati, OH, USA). Preprints of Extended Abstracts presented at the ACS National Meeting, American Chemical Society, Division of Environmental Chemistry, 41(1), 807-810 (English) 2001. CODEN: PEACF2. ISSN: 1524-6434. Publisher: American Chemical Society, Division of Environmental Chemistry.

AB Gaseous Hg species in **flue gas** are detd. using USEPA Method 5 sampling. In this sampling, a hole is drilled into the stack wall and a vol. of gas is isokinetically drawn through a heated probe, through a filter to remove particles, and through a series of gas scrubbing solns. designed to selectively **capture** gaseous **Hg** species. Gaseous speciation is achieved by selective, sequential capture in the impinger solns. Anal. of **Hg** on the **filter** and in impinger solns. is done by oxidizing all Hg species and analyzing with cold vapor at. absorption spectrometry. In this work, an impinger sampling train for Hg speciation was developed which uses tris buffer to **capture** oxidized **Hg** and aq. I to **capture** elemental **Hg**. The elegance of this approach is in the generation of I just prior to sampling to **capture** elemental **Hg** and low-level measurement of all Hg species using inductively coupled plasma mass spectrometry (ICP-MS) with direct injection nebulization (DIN). This work evaluated impinger solns. amenable to DIN-ICP-MS which may be used to **capture**

gaseous oxidized **Hg**; developed an impinger soln. to capture Hg0 amenable to DIN-ICP-MS; developed an EPA Method 5-type sampling train of impingers for low-level Hg speciation which are completely amenable to DIN-ICP-MS; and tested proposed impingers for Hg speciation against the Ontario Hydro Method in the bench scale combustion of an Ohio bituminous **coal**.

IT **7553-56-2**, Iodine, reactions
(aq.; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

CC 59-1 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51, 79

ST elemental oxidized mercury detn **coal** combustion **flue gas**; direct injection nebulization inductively coupled plasma mass spectrometry

IT Gas analysis
(**coal** combustion **flue gas**; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

IT **Flue gases**
(**coal** combustion; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

IT 7722-84-1, Hydrogen peroxide, uses
(acidified; impinger soln.; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

IT **7553-56-2**, Iodine, reactions
(aq.; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

IT 77-86-1, Tris buffer
(impinger soln.; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

IT 7439-97-6, Mercury, analysis
(oxidized and elemental; capture and detn. of mercury in **coal** combustion emissions using iodine-based impingers and direct injection nebulization-inductively coupled plasma-mass spectrometry)

L26 ANSWER 18 OF 26 HCA

133:197454 Review of recent studies on mercury in the atmosphere.
Marumoto, Koji; Sakata, Masahiro (Central Research Institute of Electric Power Industry, Komae Research Laboratory, Iwado-kita, Komae-shi, Tokyo, 201-8511, Japan). Chikyu Kagaku (Nippon Chikyu Kagakkai), 34(2), 59-75 (Japanese) 2000. CODEN: CKNKDM. ISSN: 0386-4073. Publisher: Nippon Chikyu Kagakkai.

AB This review, with many refs., presents the conclusions of recent international studies pertaining to the speciation, emission sources, and fate of mercury in the atm. The background level of total gaseous mercury concn. in the air is 1-3 ng/m3. Mercury takes various phys. and chem. forms in the atm., mainly gaseous elemental mercury [Hg(0)], gaseous divalent mercury [Hg(II)], and particulate mercury [Hg(p)]. Hg(0) is the dominant form of mercury in the atm., and the concns. of Hg(II) and Hg(p) are generally only a few percent of the total concn. of airborne mercury. Because these three species have different characteristics with respect to transport, deposition, and influences on ecosystems, mercury speciation measurements are of great importance. Mercury is emitted from natural and anthropogenic sources. Natural sources include volcanic activity and emission from sea, soil, and vegetation surfaces. Anthropogenic sources include **coal** combustion, waste incineration, and nonferrous metal refining and smelting. Mercury emitted from these sources into the atm. is removed by wet and dry deposition. Wet deposition is the main process of **mercury removal** from the atm. In this process, atm. oxidn. processes in which Hg(0) is converted to Hg(II) by O3, H2O2, and **Cl2** play important roles.

CC 59-0 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51, 53, 54, 61

IT Air pollution
Airborne particles
Atmosphere (earth)
Environmental transport
Flue gases
Incineration
Water pollution
(atm. mercury source, speciation, and fate)

IT **Flue gases**
(incinerator; atm. mercury source, speciation, and fate)

L26 ANSWER 19 OF 26 HCA COPYRIGHT 2003 ACS on STN
133:33858 Mercury control research: effects of fly ash and **flue gas** parameters on mercury speciation. Lee, Chun Wai; Kilgroe, James D.; Ghorishi, S. Behrooz (National Risk Management Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC, USA). Annual Waste-to-Energy Conference, Proceedings of a Specialty Conference, 6th, Miami Beach, FL, United States, May 11-13, 1998, 221-238. Air & Waste Management Association: Pittsburgh, Pa. (English) 1998. CODEN: 69AAXQ.

AB In **flue gas** from combustion systems, mercury (Hg) is typically in the vapor phase at **flue gas** cleaning temps., and the control of Hg emissions is dependent on the

specific Hg compds. that are present (speciation) and the type of air pollution devices employed. In dry and semi-dry scrubbing systems, the control of Hg emissions is dependent on the sorption of Hg by particulate matter (PM) which can be subsequently collected in a PM control device. In wet scrubbing systems, the principal mechanisms of control are the removal of sol. forms of Hg and the collection of particle-bound Hg. At combustion temps., Hg is believed to be predominantly in the form of elemental mercury (Hg0). As the **flue gas** is cooled, thermochem. equil. calcns. indicate that Hg0 is converted primarily to ionic mercury (Hg++) in the form of mercuric oxide (HgO) or mercuric chloride (HgCl2). Hg0 is insol. in water, but HgO has a low soly. while HgCl2 is highly sol. The oxidn. of Hg0 to an ionic form depends on the temp., the time-temp. profile, the **flue gas** compn., the reaction kinetics, and the presence of solids that may catalyze reactions. Bench-scale expts. were conducted to study the effects of **flue gas** and fly ash parameters on the oxidn. of Hg0 in simulated **flue gases** contg. hydrogen chloride (HCl). Gas-phase studies indicated that the in-flight post-combustion oxidn. of Hg0 in the presence of HCl is very slow and proceeds at measurable rates only at high temps. (>700.degree.C) and high HCl concns. (>200 ppm). The presence of sulfur dioxide (SO2) and water vapor in the simulated **flue gas** significantly inhibited the gas-phase oxidn. of Hg0. On the other hand, a preliminary investigation indicated that the gas-phase reaction of Hg0 with chlorine (**Cl2**) is fast. At 40.degree.C and in the presence of 50 ppm **Cl2**, 100% of the input Hg0 was oxidized to HgCl2 in less than 2 s, indicating that **Cl2** is a much more active chlorinating agent than HCl. The effects of fly ash compn. were investigated using a fixed-bed reactor contg. different model fly ashes (simulated fly ash) consisting of mixts. of some major components found in **coal** and municipal waste combustor (MWC) fly ashes. Work to date has focused on the potential catalytic oxidn. of Hg0 by two- and three-component model fly ashes composed of mixts. of: Al2O3, SiO2, Fe2O3, CuO, and CaO. Copper and iron oxides were the only two components that exhibited significant catalytic activity in the surface-mediated oxidn. of Hg0. The reactivity of these two metals is hypothesized to be affected through the formation of a chlorinating agent (most probably **Cl2**) from gas-phase HCl on the surface of metal oxides (the Deacon process reaction). Copper was much more effective in the oxidn. of Hg0 than iron, and its catalytic activity was less sensitive to the presence of oxidn. inhibitors (SO2 and water vapor). The presence of a small quantity of CuO (0.1% wt) in the model fly ash caused a 95% oxidn. of Hg0 in the temp. range of 150 to 250.degree.C. The same extent of Hg oxidn. was obtained by adding 14% (wt) Fe2O3 to the model fly ash.

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 60

ST mercury control **flue gas** scrubbing; fly ash
flue gas parameter **mercury**
removal scrubbing

IT Air pollution
(control; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT Municipal refuse
(**flue gases** from incineration of; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT Ashes (residues)
(fly; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT Dry **scrubbing**
Flue gases
Reaction kinetics
Simulation and Modeling, physicochemical
Waste incineration
Wet **scrubbing**
(**mercury** control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT Water vapor
(mercury oxidn. in presence of; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT 7446-09-5, Sulfur dioxide, reactions 7647-01-0, Hydrochloric acid, reactions
(**flue gases** contg.; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT 1305-78-8, Calcium oxide (CaO), miscellaneous 1309-37-1, Iron oxide (Fe2O3), miscellaneous 1317-38-0, Copper oxide (CuO), miscellaneous 1344-28-1, Aluminum oxide (Al2O3), miscellaneous 7631-86-9, Silica, miscellaneous
(in fly ash; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT 7487-94-7, Mercury chloride, processes 21908-53-2, Mercury oxide (HgO)
(mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT 7439-97-6, Mercury, processes
(mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)
IT 7732-18-5, Water, reactions
(vapor; mercury control in **flue gas** scrubbing systems: effects of fly ash and **flue gas** parameters on mercury speciation)

L26 ANSWER 20 OF 26 HCA COPYRIGHT 2003 ACS on STN
130:300892 Wet scrubbing with an oxidizing solution for **removal** of elemental **mercury** from a **flue-gas** stream. Mendelsohn, Marshall H.; Huang, Hann-sheng (United States Dept. of Energy, USA). U.S. US 5900042 A 19990504, 9 pp. (English). CODEN: USXXAM. APPLICATION: US 1997-912582 19970818.

AB The Hg vapor in a gas stream is removed by wet scrubbing or a similar contact with aq. oxidizing soln. to convert the elemental Hg to sol. compds. The aq. oxidizing solns. contain I, Br, Cl, HClO3, and/or chlorates, and are suitable for wet scrubbing of **coal** -combustion **flue gas** contg. Hg vapor. Exptl. **removal** of **Hg** was 71.1% when the Hg vapor in flowing air was injected into aq. soln. contg. 250 ppm Br, vs. <1% removal by aq. scrubbing.

IT **7553-56-2**, Iodine, processes **7726-95-6**, Bromine, processes **7782-50-5**, Chlorine, processes
(scrubber soln. with; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** from **flue-gas** stream)

RN 7553-56-2 HCA
CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

RN 7726-95-6 HCA
CN Bromine (8CI, 9CI) (CA INDEX NAME)

Br—Br

RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IC ICM C22B003-10
NCL 075742000
CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51
ST **mercury** vapor **removal** gas scrubbing oxidizing soln; bromine aq **scrubbing flue gas mercury removal**
IT Alkali metal compounds
(chlorates, scrubber soln. with; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** from **flue-gas** stream)
IT **Scrubbers**
(**mercury removal** by; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** from

flue-gas stream)

IT **Flue gases**
(**mercury removal** from; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** from **flue-gas** stream)

IT 124-38-9, Carbon dioxide, uses 7446-09-5, Sulfur dioxide, uses 10102-43-9, Nitrogen oxide (NO), uses
(**flue gas** contg., scrubbing of; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** vapor from **flue gas**)

IT **7553-56-2**, Iodine, processes **7726-95-6**, Bromine, processes **7782-50-5**, Chlorine, processes 7790-93-4, Chloric acid
(scrubber soln. with; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** from **flue-gas** stream)

IT 7439-97-6, Mercury, processes
(vapor; wet scrubbing with aq. oxidizing soln. for **removal** of **mercury** from **flue-gas** stream)

L26 ANSWER 21 OF 26 HCA COPYRIGHT 2003 ACS on STN

130:56272 XAFS Examination of Mercury Sorption on Three Activated Carbons. Huggins, Frank E.; Huffman, Gerald P.; Dunham, Grant E.; Senior, Constance L. (CME/CFFLS, University of Kentucky, Lexington, KY, 40506-0043, USA). Energy & Fuels, 13(1), 114-121 (English) 1999. CODEN: ENFUEM. ISSN: 0887-0624. Publisher: American Chemical Society.

AB The sorption of mercury, as Hg0 and HgCl2, in a synthetic **flue gas** (SFG) by three activated carbons has been examd. by XAFS spectroscopy. The three carbons consisted of a sulfur-activated carbon, an iodine-activated carbon, and an activated carbon derived from lignite. In addn. to mercury, the occurrence and behavior of sulfur, chlorine, calcium, and iodine were also examd. by XAFS spectroscopy. These other elements were present either as activating species on the carbons or as reactive components (SO2, HCl) in the SFG. The XAFS results showed that each type of activated carbon behaves differently with respect to sorption of mercury and other species from the SFG. For the iodine- and sulfur-activated carbons, the XAFS data confirm that it is the activating element (I or S) that forms a sorption complex with mercury. However, the activated carbon from lignite exhibited a more variable behavior that reflected the conditions of the expts., in particular whether HCl or HgCl2 was present in the SFG. This study reveals some of the complexities that are involved in low-temp. sorption of mercury by activated carbons in that the sorption mechanism clearly involves acidic species of sulfur and chlorine in the gas phase, the affinity of the carbon for such species, and the nature of the active sites on the carbons, in addn. to the mercury speciation.

IT **7553-56-2**, Iodine, processes **7782-50-5**, Chlorine, processes

(XAFS examn. of mercury sorption on activated carbons)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 73

IT **Flue gases**
(from **coal** combustion, **mercury removal** from; XAFS examn. of mercury sorption on activated carbons in relation to)

IT 7440-70-2, Calcium, processes 7446-09-5, Sulfur dioxide, processes **7553-56-2**, Iodine, processes 7647-01-0, Hydrochloric acid, processes 7704-34-9, Sulfur, processes **7782-50-5**, Chlorine, processes
(XAFS examn. of mercury sorption on activated carbons)

L26 ANSWER 22 OF 26 HCA COPYRIGHT 2003 ACS on STN

130:28621 Mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas**. Galbreath, Kevin C.; Zygarlicke, Christopher J.; Toman, Donald L. (Energy & Environmental Research Center, Grand Forks, ND, 58202-9018, USA). Proceedings, Annual Meeting - Air & Waste Management Association, 91st, RA79B08/1-RA79B08/15 (English) 1998. CODEN: PAMEE5. ISSN: 1052-6102. Publisher: Air & Waste Management Association.

AB Hg-Cl-fly ash interactions were investigated using a 42-MJ/h **coal** combustion system. Ten .mu.g Hg(g)/m3 and 100 ppm by vol. (ppmv) HCl(g) were injected into a simple 1250.degree. gas mixt. (8.5 mol% O2, 91.5 mol% N2). In addn., a Powder River Basin subbituminous **coal** from the Absaloka mine (0.052 .+-.0.005 ppm Hg, 50 .+-.10 ppm Cl) was burned at an excess O2 of 8.5 mol% while 50- and 100-ppmv HCl(g) were injected into the furnace at 1330.degree.. Hg and Cl speciation analyses of the resulting **flue gases** were performed at 200.degree. or 250.degree.. **Flue gas** residence time in the combustor was approx. 2.5 s. Baseline testing indicated that 50% of the Hg0(g) spike was transformed to a gaseous mercuric compd. (Hg2+X[g]), possibly through a catalyzed Hg0(g)-O2 (g) reaction involving a refractory metal oxide compd. Low recoveries of Hg0(g) and the formation of **Cl2**(g) during 100-ppmv HCl(g) spike tests into the gas mixt. suggest that HgCl2(s,l) was formed and deposited in the combustor. Baseline testing of Absaloka **coal** indicated that on av. 41%, 19%, and 40% of the total Hg (5.5 .+-.0.6 .mu.g/m3) were present as particle-assocd. mercury

(Hg[p]), Hg2+X(g), and Hg0(g), resp. Relatively high Hg(p) concns. are consistent with previous measurements, thus corroborating the enhanced Hg sorption capacity of Absaloka fly ash. Cl detns. in the **flue gas** and fly ash indicate that HCl(g) was scavenged by ash particles. The formation of particle-assocd. Cl, however, inhibited Hg-fly ash sorption. This inhibition effect is consistent with exptl. investigations of lime (CaO[s])-based sorbents for Hg and HCl(g) control, thus suggesting that CaO(s) is an important Hg-sorption component of Absaloka fly ash. X-ray diffraction analyses confirm that CaO(s) is a major component of Absaloka fly ash.

IT **7782-50-5**, Chlorine, reactions
(mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl— Cl

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 51

ST mercury chlorine fly ash interaction **coal flue gas**; sorption mercury fly ash **coal flue gas**

IT Ashes (residues)
(**coal** fly; mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas**)

IT Sorbents
(lime and fly ash; mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to **mercury removal** with lime and fly ash)

IT Lime (chemical)
(mercury sorption by; mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to **mercury removal** with lime)

IT **Flue gases**
(mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas**)

IT Sorption
(of mercury in **flue gas**; mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to)

IT 7439-97-6, Mercury, reactions
(mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas**)

IT 7647-01-0, Hydrochloric acid, reactions
(mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to)

IT **7782-50-5**, Chlorine, reactions
(mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to)

IT 7487-94-7, Mercury chloride ($HgCl_2$), formation (nonpreparative)
(mercury-chlorine-fly ash interactions in a **coal** combustion **flue gas** in relation to formation of)

L26 ANSWER 23 OF 26 HCA COPYRIGHT 2003 ACS on STN
124:65058 Laboratory-scale investigation of sorbents for mercury control. Miller, Stanley J.; Laudal, Dennis L.; Chang, Ramsay; Bergman, Perry D. (Energy and Environmental Research Center, Grand Forks, ND, USA). Proceedings, Annual Meeting - Air & Waste Management Association, 87th(Vol. 6A, Air Pollution Sources & Control), 1-15, Paper 94-RA114A.01 (English) 1994. CODEN: PAMEE5. ISSN: 1052-6102. Publisher: Air & Waste Management Association.

AB The **removal** of **Hg** from **coal**-firing power plant **flue gases** was developed. The inlet Hg speciation for the Absaloka subbituminous and Blacksville bituminous **coal** was significantly different. Less Hg was retained in the baghouse hopper ash with the bituminous **coal** even though the oxidized Hg and loss-on-ignition were much higher. An I-impregnated activated carbon provided effective Hg adsorber at 150-200.degree. but the oxidized **Hg removal** takes place at lower temps.

IT **7553-56-2**, Iodine, uses
(iodine impregnated activated carbon; lab.-scale investigation of sorbents for **mercury removal** from sub- and bituminous **coal** combustion)

RN 7553-56-2 HCA

CN Iodine (8CI, 9CI) (CA INDEX NAME)

I—I

CC 59-4 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 52

ST **mercury removal coal flue gas**; bituminous **coal flue gas mercury removal**; subbituminous **coal flue gas mercury removal**; sorbent mercury **coal flue gas**; activated carbon iodine treated sorbent

IT **Flue gases**
(lab.-scale investigation of sorbents for **mercury removal** from sub- and bituminous **coal** combustion)

IT **Coal**
(subbituminous, bituminous; lab.-scale investigation of sorbents for **mercury removal** from sub- and bituminous **coal** combustion)

IT **7553-56-2**, Iodine, uses
(iodine impregnated activated carbon; lab.-scale investigation of sorbents for **mercury removal** from sub- and bituminous **coal** combustion)

IT 7440-44-0, Carbon, uses
(iodine impregnated activated; lab.-scale investigation of sorbents for **mercury removal** from sub- and bituminous **coal** combustion)
IT 7439-97-6, Mercury, processes
(lab.-scale investigation of sorbents for **mercury removal** from sub- and bituminous **coal** combustion)

L26 ANSWER 24 OF 26 HCA COPYRIGHT 2003 ACS on STN
113:237057 Carbon-containing wastes from **coal** vortex combustion at a heat and electric power plant as adsorbents of mercury-containing anions from dechlorinated brines. Kochetkova, R. P.; Sorkin, E. I.; Shiverskaya, I. P.; Voronkov, V. V.; Apasov, V. L.; Polyakov, V. V. (Inst. Nefte- Uglekhim. Sint., Irkutsk, USSR). Zhurnal Prikladnoi Khimii (Sankt-Peterburg, Russian Federation), 63(8), 1684-8 (Russian) 1990. CODEN: ZPKHAB. ISSN: 0044-4618.
AB Coke particles from low-temp. vortex combustion of brown **coal** had anion-exchange properties and after activation in fluidized bed by steam and CO2, which enhanced the properties, could be used as adsorbent for the removal of [HgCln]2-n from chloralkali plant wastewater. The anion-exchange properties of the adsorbent were adversely affected by oxidative treatment but could be restored after thermal treatment in an inert gas atm.
IT **7782-50-5P**, Chlorine, preparation
(manuf. of, in chloralkali plant, wastewater from, complex **mercury** anion **removal** from, by carbonaceous wastes from brown **coal** combustion)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 60-2 (Waste Treatment and Disposal)
Section cross-reference(s): 49
ST **mercury removal** chloralkali wastewater; brown **coal** coke mercury adsorbent
IT Waste solids
(carbonaceous residues from brown **coal** combustion, in treatment of chloralkali plant wastewater for complex **mercury** anion **removal**)
IT Wastewater treatment
(adsorption, of chloralkali plant **effluents** for complex **mercury** anion **removal**, carbonaceous wastes from brown **coal** combustion in)
IT Coke
(brown-**coal**, waste, in treatment of chloralkali plant wastewater for complex **mercury** anion **removal**)
IT 1310-73-2P, Sodium hydroxide, preparation **7782-50-5P**, Chlorine, preparation
(manuf. of, in chloralkali plant, wastewater from, complex

mercury anion **removal** from, by carbonaceous
wastes from brown **coal** combustion)

IT 51312-24-4, **Mercury** chloride
(**removal** of, from chloralkali plant wastewater,
carbonaceous wastes from brown **coal** combustion in)

L26 ANSWER 25 OF 26 HCA COPYRIGHT 2003 ACS on STN

81:82121 **Recovery** of **mercury** from mercurous bearing
liquids. Gerow, Raymond F.; Soule, Stanley B. (GAF Corp.). U.S. US
3802910 19740409, 6 pp. (English). CODEN: USXXAM. APPLICATION: US
1972-243478 19720412.

AB By bringing an aq. **effluent** having a pH 2-11 and contg.
1-500 ppm dissolved or metallic Hg into ultimate contact with a
H2O-stable solid metallic reducing agent having a greater soln.
potential than Hg, elemental **Hg** is **removed**. The
liberated Hg amalgamates on the surface of the reducing agent and
also **coalesces** into droplets. The resulting impure Hg is
purified by acid washing or retorting. Zn-coated graphite particles
are used as the reducing agent. The method is applicable to the
recovery of **Hg** from the aq. brine **effluent**
of a Cl-producing cell using a Hg cathode.

IT **7782-50-5P**, preparation
(brine from manuf. of, **mercury removal** from,
zinc-coated graphite in)

RN 7782-50-5 HCA

CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

IT **7439-97-6P**, preparation
(**recovery** of, from electrolytic brine by zinc-coated
graphite)

RN 7439-97-6 HCA

CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

IC C23C

NCL 117100000M

CC 60-2 (Sewage and Wastes)
Section cross-reference(s): 49, 54

ST **mercury recovery** brine amalgam; chlorine manuf
mercury recovery

IT Brines
(**mercury removal** from, from chlorine manuf.,
zinc-coated graphite in)

IT **7782-50-5P**, preparation
(brine from manuf. of, **mercury removal** from,
zinc-coated graphite in)

IT 7440-66-6, uses and miscellaneous

(graphite coated by, **mercury recovery** by,
from electrolytic brine)
IT **7439-97-6P**, preparation
(**recovery** of, from electrolytic brine by zinc-coated
graphite)
IT 7782-42-5, uses and miscellaneous
(zinc-coated, **mercury removal** by, from
electrolytic brine)

L26 ANSWER 26 OF 26 HCA COPYRIGHT 2003 ACS on STN
78:140014 Reuse of waste water in chemical industries. Shinagawa,
Toshiyoshi (Sansei Dev. Co., Ltd., Japan). Nenryo oyobi Nensho,
39(12), 1185-92 (Japanese) 1972. CODEN: NEONAA. ISSN: 0369-3783.
AB Cooling water used in **coal** chem. complexes in Omuta,
Japan, was recovered with spray ponds, cooling towers, etc. The
reuse of water in an electrolytic plant (electrolysis of NaCl by the
Hg process) involved **recovery** of cooling water for
H and Cl, and of wash water for the electrolytic cells. In an
agrochem. plant manufg. Na pentachlorophenolate, the wash water for
a neutralizer was recovered and recycled as a scrubber for the gas
effluent. Treatment of Hg waste water and activated sludge
treatment of phenolic waste water are also discussed.
IT **7782-50-5P**, preparation
(waste water from manuf. of, treatment of, for reuse)
RN 7782-50-5 HCA
CN Chlorine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Cl—Cl

CC 60-2 (Sewage and Wastes)
Section cross-reference(s): 5, 52, 77
ST water reuse **coal** chem complex; electrolytic plant water
reuse; agrochem plant water reuse
IT **Coal**
(chem. products manufd. from, treatment of waste water from, for
reuse)
IT 131-52-2P 1310-73-2P, preparation **7782-50-5P**,
preparation
(waste water from manuf. of, treatment of, for reuse)